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HARD-CLAM FISHERY OF THE ATLANTIC COAST

By Richard E. Tiller,* John B. Glude,** & Louis D. Stringer**

(Prepared at the request of the Atlantic States Marine Fisheries Commission)

INTRODUCTION

This report supplements biological studies being conducted by the U. S. Fish and Wildlife Service's Clam Investigations, and deals with the present status and past trends of the fishery for the hard clam or quahaug (*Venus mercenaria*),¹ the types of gear employed, and the particular problems facing the industry in each of the Atlantic coastal states.

The information on which the study is based was obtained from personal interviews during 1949, 1950, and 1951 with clam fishermen, dealers, and state conservation personnel in all of the Atlantic Coast states; and from the Service's catch statistics. The results of these surveys have been used in planning and establishing the clam research program authorized by Congress in 1948.

Members of state conservation agencies, universities, and research groups contributed information used in this report. Dealers and fishermen have been thoroughly cooperative in describing the industry and its problems. The first part of this report is a consideration of the general aspects of the fishery, including data pertaining to volume and value of production, location of the fishing grounds, and a description of the types of gear employed. The second part includes state summaries, and deals more in detail with the production and problems of the individual states. Catches statistics have been taken from the U. S. Fish and Wildlife Service's Administrative Reports or Statistical Digests.

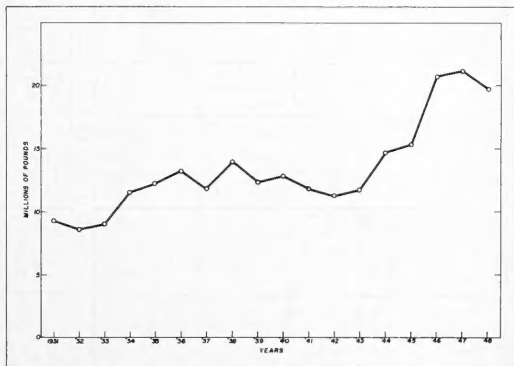


FIG. 1 - TOTAL CATCH OF HARD CLAMS FOR ATLANTIC COAST STATES, 1931-48. WHEN STATISTICAL SURVEYS WERE INCOMPLETE, THE ANNUAL TOTALS WERE CALCULATED FROM AN AVERAGE OF PRECEDING AND SUCCEEDING YEARS.

GENERAL ASPECTS OF THE FISHERY

CATCH AND VALUE: Although Atlantic Coast catch statistics for hard clams from 1931 to 1948 show a steady upward trend in production to a level above previous peak years (table 1 and figure 1), the total annual production and value are small

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¹/THIS DOES NOT INCLUDE THE OCEAN QUAHAG (*ARCTICA ISLANDICA*).

when compared with other shellfish resources of the Atlantic States. In value per pound of shucked meats, however, hard clams outrank all others except lobsters. A summary of the production and value of the shellfish resources based on Fish and Wildlife Service catch statistics for 1945 (the most recent year for which complete data are available) is presented in table 2.

LOCATION OF THE FISHERY:

Hard clams occur in nearly every sheltered bay, cove, or inlet along the entire Atlantic Coast, but the fishery is centered largely in the southern New England and Middle Atlantic States. New York leads in production, followed in descending order by New Jersey, Rhode Island, and Massachusetts. On the basis of a five-year average (1944-48), these four states produced 85 percent of the hard clams caught on the entire coast (figure 2). Virginia, Florida, and North Carolina are the ranking southern states and account for an additional 13 percent.

The locations of the commercially-fished areas along the Atlantic Coast are shown in figures 3, 6, 8, and 10. The coast has been divided into the four sections as follows:

New England - Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut.

Middle Atlantic - New York, New Jersey, and Delaware.

Chesapeake - Maryland and Virginia

South Atlantic - North Carolina, South Carolina, Georgia, and Florida.

TYPES OF GEAR AND PRODUCTION METHODS: The usual habitat of the hard clam is in relatively shallow water, and the fishery therefore lends itself quite well to hand-operated gear. Where the beds are exposed at low tide, or covered by only very shallow water, short-handled hoes or rakes are used almost entirely. Typically a New England gear, hoes are rarely used south of Rhode Island. The design varies somewhat from one locality to another, but the usual style is about two feet in length and is provided with four or five flattened tines 8 to 10 inches long as shown in figure 5. Forks and picks replace hoes in the southern states. These are basically the same in design, but have somewhat longer handles, and picks usually have only two or three closely spaced short tines.

In deeper water, long-handled rakes and tongs are employed. Rakes are used in all of the coastal states, and vary in pattern from one area to another, depending on the depth of water, type of bottom, and preferences of the local fishermen. Bull rakes, typically used in New England, are provided with detachable heads, 3 to 4 feet in width, fitted with closely-spaced curved teeth which form a horizontal basket. Spacing of the teeth varies according to the minimum legal size in the different states (figure 7).

Long sectional wooden handles or stales are fitted to the rake heads, the length depending on the depth fished, and the strength and skill of the fishermen. Occasional reports were obtained of stales over 50 feet long, although 36 feet is usually the maximum length. In fishing, the rake is shoved out and away from the

Table 2 - Shellfish Resources of the Atlantic Coast States, 1945

Species	Quantity	Value	Avg. Price per Pound
	1,000 Lbs.	\$1,000	¢
Blue crab (in shell)	60,258	4,293	7
Shrimp (heads on)	55,947	4,227	8
Oyster (meats)	52,920	19,383	37
Lobsters (Northern, in shell)	22,727	9,460	42
Hard clam (meats)	15,332	5,923	39
Soft clam (meats)	8,875	1,954	22
Scallop (meats)	6,619	2,399	36

anchored boat, and then worked through the bottom in a series of short tugs to a vertical position, from which it is hauled up. The long curved teeth force a

roll of bottom soil ahead of them as the rake is pulled, and the clams are held, while the soil is washed through. Generally, the use of rakes is restricted to softer bottom than that which can be fished with tongs.

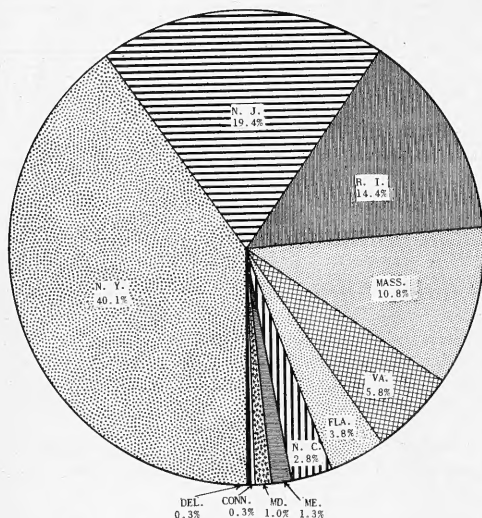


FIG. 2 - AVERAGE HARD-CLAM PRODUCTION BY STATES, 1944-48, EXPRESSED IN PERCENT.

Basket rakes, on which the ends are closed by wire mesh are used in some localities, particularly where clams are abundant. They are very popular in Massachusetts for the recovery of planted clams from privately-leased grounds.

Tongs (figure 9) are extensively used in all states except Florida, and accounted for over 60 percent of all the hard clams caught in the coastal states during the period from 1944 to 1948. Basically, tongs are a basket formed by two opposing sets of teeth, which are opened and closed by means of

long scissor-like handles. The operating principle of tongs restricts their use to more shallow water than that which can be fished with rakes. Tong shafts over 28 feet in length are rarely used and in most cases do not exceed 18 to 20 feet.

Dredges are more varied in their design than any other type of clam gear. Different types are used in the power-boat fishery of Massachusetts and Rhode Island, as shown in figure 4, than in the sail fishery of New Jersey. The modified crab and oyster dredges used in lower Chesapeake Bay are of a still different pattern. Conservation laws in the different states regulate the size, weight, spacing and length of teeth and other features in the design of dredges.

The five-year (1944-48) average annual production and value by gear and by state are shown in table 3 and figure 11.

State	TONGS		RAKES		DREDGES		BY HAND		HOES		CRABS		TOTAL	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	1,000 Lbs.	\$1,000	1,000 Lbs.	\$1,000	1,000 Lbs.	\$1,000	1,000 Lbs.	\$1,000	1,000 Lbs.	\$1,000	1,000 Lbs.	\$1,000	1,000 Lbs.	\$1,000
Maine	-	-	-	-	-	-	-	-	246	50	-	-	246	50
Mass.	279	81	1,149	353	473	124	-	-	67	18	-	-	1,968	576
R. I.	1,405	396	366	106	853	210	-	-	-	-	-	-	2,624	711
Conn.	26	9	24	8	-	-	-	-	-	-	-	-	50	17
N. Y.	7,312	2,040	-	-	-	-	-	-	-	-	-	-	7,312	2,040
N. J.	1,188	405	1,104	397	147	55	424	149	-	-	-	-	2,833	1,006
Del.	5	2	20	8	20	9	-	-	-	-	-	-	45	17
Va.	76	42	84	47	2	1	25	13	-	-	-	-	197	103
N. C.	503	266	341	181	53	29	187	83	-	-	-	-	1,054	559
S. C.	-	-	96	29	-	-	4	1	-	-	-	-	100	30
Me.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fla.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Del.	-	-	1	-	103	26	-	-	9	2	25	6	138	34
Total	10,764	4,041	3,185	1,128	1,651	452	610	246	322	70	25	6	16,557	5,943
Percentage of Total	65.0	68.0	19.2	19.0	10.0	7.6	3.7	4.1	2.0	1.2	0.1	0.1	100.0	100.0

GENERAL REGULATORY MEASURES: It would be impractical to attempt a detailed discussion of conservation laws dealing with the hard clam in this report. The

Table 4 - Summary of General State or Local Regulations Governing the Hard-Clam Fishery of Atlantic Coast States

State	Minimum Size	Gear	Season
Maine	2" longest diameter	Regulated by each county or town.	Regulated by each county or town.
Massachusetts	2" longest diameter	Regulated by each town.	Regulated by each town.
Rhode Island	Nothing that will pass through a $1\frac{1}{2}$ " ring.	Power dredges limited to Sakonnet River. No limit on hand gear.	Power dredges from Dec.1 to Mar.31. No season on hand gear.
Connecticut	Nothing that will pass through a $1\frac{1}{2}$ " ring	No power gear on public grounds.	None
New York	1" thickness	No power gear on public grounds.	None
New Jersey	$1\frac{1}{2}$ " in length	No power-operated vessel.	None
Delaware	None	No dredge more than 5 ft. 2 in. wide or with rings less than 2" in diameter.	None
Maryland	None	May be taken by rakes, tongs, patent tongs, dredges, or hand scrapes, as defined, and by no other means.	None
Virginia	None	Regulated in specific counties and sections.	None
North Carolina	$1\frac{1}{2}$ " from hinge to mouth	Only with clam dredges, hand rakes, or by hand.	None
South Carolina	None	No dredging in less than 12' at low water.	Closed May 1 to Oct. 1.
Georgia	None	None	None
Florida	2" from hinge across widest part	None	None

general regulations regarding size limits, gear limits, and closed seasons now in effect are summarized in table 4. These vary considerably from one state to another, and even within a single state, where individual townships have jurisdiction over the clam-producing areas within their boundaries. It should be understood that this table is simply a summary to aid the reader in understanding the meaning of sub-legal clams and to present some idea of the conservation measures being employed. It should not be used as a reference for state regulations.

TRADE CATEGORIES: Considerable variation in marketing procedures and size categories is encountered in different areas along the Atlantic Coast. A few general rules, however, apply to all areas.

The smallest legal-size hard clams--termed "necks," "little necks," or "steamer necks"--command the highest price in all areas. These small clams are used principally in restaurants, where they are served freshly opened on the half shell, or steamed and served with drawn butter.

The term "cherrystone" originated in the Chesapeake area in the vicinity of Cherrystone Creek, and refers to a clam slightly larger than the "little neck" classification common in New England. This size, too, is popular in most areas when served raw or steamed.

Clams larger than the cherrystone size are nearly always used in the preparation of chowders or in canned whole or minced clams, and are classed as "mediums" and "chowders." These larger sizes command a considerably lower price.

The manner in which clams are bought from the fishermen varies also from one area to another. Throughout New England and part of the Middle Atlantic area, clams are sold by weight or by bushel measure, although the weight of a bushel varies slightly from one state to another. This variation is due to the fact that the yield in shucked meats of clams from upper New England is greater than from lower New England and the Middle Atlantic. In the Chesapeake and southern states the small, medium, and large clams are separated and sold according to the number per bushel.

MAINE

LOCATION OF THE FISHERY: Although small quantities are harvested for home consumption elsewhere along the coast, commercial fishing for hard clams is limited to a small area in upper Casco Bay, bounded on the east and west by the Harraseeket and New Meadows Rivers, respectively. Maquoit Bay leads in production, and smaller amounts are taken from Quahaug Bay and sections of the New Meadows River.

GEAR AND METHODS: With the exception of entries for "dredges" in 1940 and 1942, "hoes" are the only gear listed in Fish and Wildlife Service records for the period 1931-48. Nearly all digging is in the intertidal zone, on beds exposed at

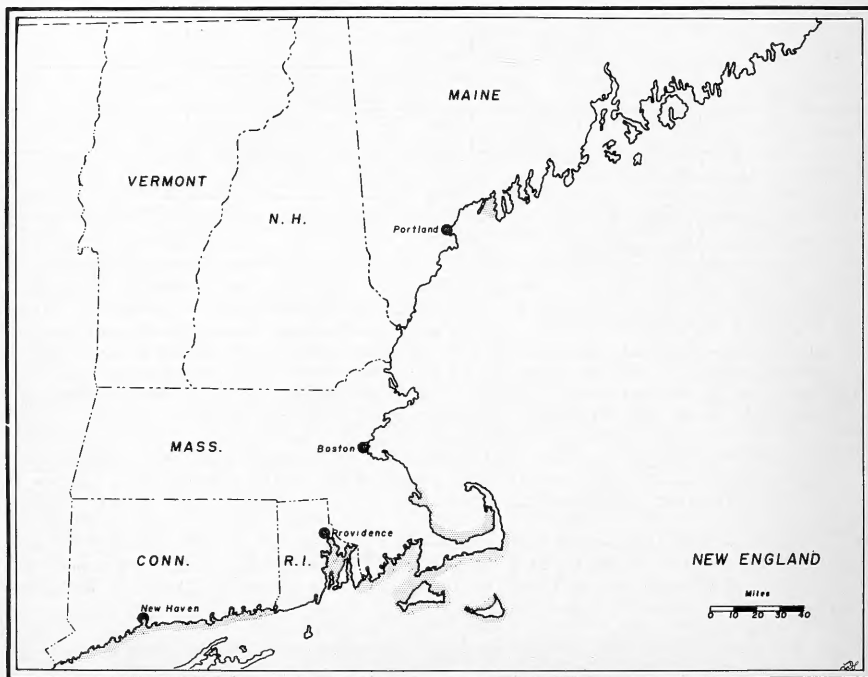


FIG. 3 - LOCATION OF HARD-CLAM FISHERY IN THE NEW ENGLAND STATES SHOWN BY STIPPLED AREAS.

low tide. Records of the Maine Department of Sea and Shore Fisheries show only four men fishing with tongs during 1950 in Maquoit Bay. A law passed in 1946 prohibits dredging from the flats or waters of Maquoit Bay.

GENERAL CONDITIONS OF THE FISHERY AND PROBLEMS: Sharp fluctuations in the annual catch have apparently occurred during the period from 1931-50, although catch records before 1942 are unreliable. According to the Maine Department of Sea and Shore Fisheries, an all-time peak was reached in 1949 and 1950, when the catch was nearly twice that of any previous year. This peak is based on a fishery for clams of one- or two-year classes.

The outlet for little necks and cherrystones is principally in the market areas of Boston, New York, and Philadelphia, and large chowders are sold to canneries in the southern New England and Middle Atlantic States.

Maine hard clams are considered particularly desirable for cannery use by some New England dealers, because the yield of shucked meats is greater than from clams in other areas.

During 1950, the Maine Department of Sea and Shore Fisheries undertook experimental transplantings of young quahaugs which had become established in such heavy concentrations that stunting and excessive mortality were occurring. Local fishermen volunteered assistance, and funds were made available by local buyers and dealers. In eighteen days, 3,012 bushels were moved to nearby commercially-depleted areas. Studies are being conducted by the State of Maine to determine if productive flats can be developed in other parts of the State.

Considering the relatively small area in which fishing is profitable, and the high level of production during the past three years, it appears that the hard-clam resources of Maine are being exploited to nearly their fullest extent. Unless successful techniques of restocking or farming are developed it is doubtful whether the fishery can expand much beyond its present production.

MASSACHUSETTS

LOCATION OF THE FISHERY: The southern shore of Cape Cod, Buzzards Bay, and the waters surrounding Nantucket, Martha's Vineyard, and the Elizabeth Islands support nearly the entire hard-clam fishery of Massachusetts. Wellfleet Harbor, near the northeast tip of the Cape, Barnstable Harbor, and Plymouth Bay also contribute to a lesser extent.

GEAR AND METHODS: Rakes are the most numerous and most productive gear in Massachusetts, followed in descending order by dredges, tongs, and hoes. Bull rakes, basket rakes, and tongs are used from small boats in shallow bays and coves along the entire Cape, on the shores of Buzzards Bay, Nantucket, Martha's Vineyard, and the Elizabeth Islands.

Dredges are restricted by law to deeper offshore waters, while hoes are used only on intertidal flats which are exposed at low tide. The Fall River or Nantucket dredge is typically a New England gear, and is rarely found in the Middle or South Atlantic States. The average dredge weighs about 450 pounds. The width of the blade, which varies from slightly less than two feet to about four feet, is usually expressed in terms of the number of teeth. Small dredges carry as few as 9 teeth, while large ones may have up to 24. The length and angle of teeth, as well as the amount of ballast attached to the dredge frame, depend largely on the nature of the bottom. The bag of the dredge is composed of iron rings and connecting links, the diameter and length of which are determined by local minimum-size limits and by the nature of the bottom.

GENERAL CONDITIONS OF THE FISHERY AND PROBLEMS: Individual townships assume the responsibility for their shellfish resources. The issuance of licenses and

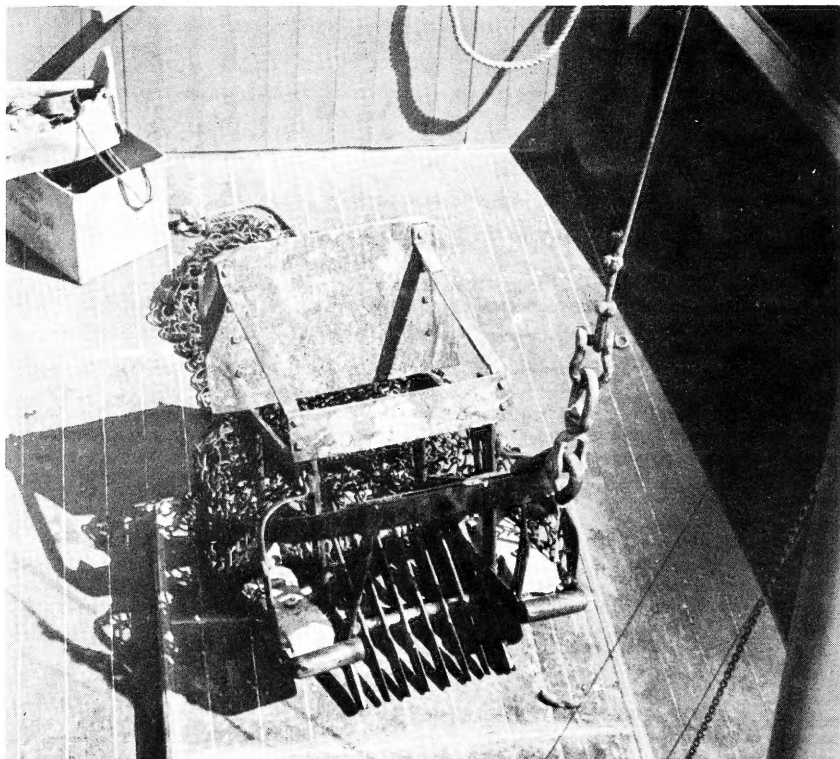


FIG. 4 - "FALL RIVER" DREDGES OPERATED BY POWER BOATS ARE USED PRINCIPALLY IN MASSACHUSETTS AND RHODE ISLAND AND ON LEASED GROUNDS IN NEW YORK.

grants for holding grounds, establishment of closed areas or seasons, and regulations of the daily catch limit for hand or power fishing are all under the control of the town selectmen or board of aldermen. State health officials work with the towns in prohibiting fishing in contaminated waters, and State conservation personnel assist in transplanting and re-seeding projects.

Nearly all of the dealers and town shellfish warden reported evidence of depletion. In nearly every instance, failure of setting combined with overfishing were believed the cause. This apparent depletion is noticeable, particularly in the scarcity of "necks," the highest-priced, and consequently most heavily fished size. Statistical records for the period from 1931-48 show periodic fluctuations in the catch, which may indicate alternate periods of successful and unsuccessful spawning. The reported decline may be, therefore, only a temporary condition, caused (as suggested by the men interviewed) by heavy cropping of recent year classes without recruitment. Nearly all of the clam-producing areas in the State are said to be good natural seeding areas, but none is characterized by successful sets every year.

With the exception of one or two areas in which pollution has reduced the size of the grounds, and thereby increased the fishing pressure on other areas, fishermen and dealers believe that the stocks of clams can still support the same number of men.

Marketing is no problem in Massachusetts. Demand reportedly exceeds supply, particularly for little necks, and some dealers have found it necessary to buy from Rhode Island to fill their orders. Canneries and restaurants provide a good outlet for chowder clams, and summer residents supplement the already heavy demand for the smaller little necks and cherrystones.

Records of the catch for each town are compiled annually, and the daily limits are adjusted when necessary to prevent overexploitation. Transplanting projects are considered very important in maintaining the productivity of the clam beds.

Fluctuations in the total catch for the State have been of about the same amplitude over a period of years. The peaks of 1931, 1938-39, and 1945-46 were surprisingly similar, and the low years of 1935-37, 1943, and 1948 were also nearly equal.

It appears that the fishery in its present condition is limited in potential production, and is being exploited to about its fullest extent.

RHODE ISLAND

LOCATION OF THE FISHERY: Hard clams are restricted to the upper two-thirds of Narragansett Bay, and are rarely found in commercial abundance beyond a depth of 25 feet. The most productive beds occur in the more shallow inshore areas.

GEAR AND METHODS: Bull rakes and tongs, similar to those employed in Massachusetts, are the most productive gears in Rhode Island.

Dredging is restricted to the lower half of the Sakonnet River, and is permitted only from December 1 to March 31. The Fall River dredge, already described for Massachusetts, is generally used, but in the last few years it has been supplanted in some areas by a hydraulic-jet dredge. This gear employs high-pressure streams of water directed into the bottom just in front of the dredge blade, and greatly increases the efficiency of dredging in firm, sandy bottom.

GENERAL CONDITION OF THE FISHERY AND PROBLEMS: No serious problems of depletion or marketing were reported by any of the persons interviewed in Rhode Island. Consistently favorable comments were obtained with respect to the present supply, the success and frequency of setting in the past several years, and the number of fishermen who find clam fishing profitable.

The present intensity of the fishery by hand methods and the possible expansion of power dredging have raised the question of the effect of increased fishing pressure on the clam population. This basic problem faces the conservation department of every state having a hard-clam fishery. Each must know how many clams can be harvested each year without causing depletion. Greenwich Bay, which supports 30 to 50 tongers and rakers, was chosen recently by the Fish and Wildlife Service for productivity studies to determine the number of bushels of clams which can safely be removed each year. Records of commercial production are balanced against information concerning growth rate, setting, predators, and natural mortality. A clam census is taken once each year to determine what the fishery is doing to the population level. The results of these studies should help the states to determine whether their fishery is too intensive or if it can safely be expanded.

Considerable concern was expressed by all dealers interviewed regarding the capture and out-of-state shipment of sub-legal clams. This business has expanded greatly during the last several years, and dealers believe that severe depletion of the clam resources of the State will result unless this practice is curtailed.

Several men interviewed (all of whom are dredge operators or who depend on the dredge fishery for their supplies of clams) mentioned another problem. Legal



FIG. 5 - THE CLAM HOE IS USED PRINCIPALLY IN NEW ENGLAND.

dredging in Rhode Island is restricted to a comparatively small area. This area has been open to dredging since 1927, and has been depleted until at present it supports only 5 boats instead of the former fleet of nearly 40. Even when equipped with "jet dredges," which can harvest clams from beds which are too hard to be fished with the regular dredges, the fishermen report that it is almost impossible for a boat to fish profitably in the dredging area. They believe firmly that unless additional grounds are opened to them, it is doubtful whether the dredge fishery can survive another season.

Pollution is a problem in some areas of Narragansett Bay, according to dealers, but is not serious enough to prevent the Rhode Island clam fishery from reaching high levels of production. Fishermen report no evidence that predators are a serious threat to any of the Rhode Island clam beds. Unless setting is unsuccessful for several years, or over-intensive fishing for sub-legal sizes is permitted, there is apparently little danger of depletion.

CONNECTICUT

The coast line of Connecticut, slightly over one hundred miles long, has practically no sheltered water. There are no barrier beaches to break the force of ocean waves, and practically no bays or coves typical of the productive areas in Massachusetts, Rhode Island, New York, and New Jersey.

The waters of Fairfield County are sheltered to a limited extent by Long Island, and together with the few small coves and inlets near New London and Mystic produce nearly the entire catch of hard clams in the state.

Tongs are the most numerous and most productive gear, and rakes rank second in catch. Power dredges are illegal on natural beds, but probably account for a considerable part of the catch of clams taken from privately-leased shellfish grounds.

Hard-clam fishing is of minor importance in Connecticut. The diggers do not depend on clams for their entire annual income, and work at this only when other fishing is unprofitable. Dealers stated there is no apparent depletion and report that hard clams never have been very abundant in this State.

Unpolluted waters are limited, and are occupied largely by privately-leased oyster grounds. These grounds yield small quantities of hard clams, but not enough to support a fishery. During World War II, one fisherman located a small bed near Milford, leased the ground, and dredged it until it became unprofitable, at which time he dropped his lease.

Commercial oyster growers make no effort to cultivate clams on their grounds, but do market those taken in their oyster-dredging operations.

Nearby cities provide a ready outlet for Connecticut clams, and marketing is never a problem. Dealers requiring large quantities for restaurant or hotel contracts often find it necessary to buy from New York or Rhode Island, particularly during the summer when tourist trade increases the demand. Even the many roadside stands which open during the summer are dependent almost entirely on out-of-state clams to supply their needs.

Highly efficient and practical methods of seeding, transplanting, and harvesting oysters have been developed by Connecticut oyster growers, and it is possible that clam farming may also be attempted if practical techniques are developed. Some of the dealers who were interviewed expressed interest in clam farming, but felt that a sufficiently rich source of seed was not available. None of them could recall having seen a heavy set of clams in Connecticut waters.

NEW YORK

LOCATION OF THE FISHERY: The hard-clam fishery of New York is concentrated principally on the southern shore of Long Island in the sheltered bays, protected by the barrier of beaches extending from the mainland nearly to the eastern tip of the island.

There is considerable production on the northern shore of Long Island, but the clam-producing areas are limited to a few relatively small bays and harbors, some of which are polluted.

Three areas of productivity may be delimited on Long Island. These are, in descending rank, as follows:

1. Great South Bay--in which the western portion is more productive than the eastern portion.
2. Port Jefferson to Cold Spring Harbor on the northern shore.
3. Greenport to Peconic Bay.

GEAR AND METHODS: The following types of gear are employed and have been arranged in descending order of their production.

1. Tongs are employed on hard bottoms to a depth of about 20 feet.
2. Bull rakes and scratch rakes are used in New York. The former have already been described in the section dealing with gear and methods. Scratch rakes are shorthanded, used by fishermen who wade in shallow areas and tread for clams with bare feet or search for siphon holes in shallow water or on exposed beds.
3. Dredges are essentially the same as those described for New England, and may be used legally only on privately-leased grounds.

GENERAL CONDITIONS OF THE FISHERY AND PROBLEMS: The fishery is in excellent condition at present, production is high, and with the exception of Great South Bay duck-farm pollution, few problems were reported by the dealers and fishermen interviewed.

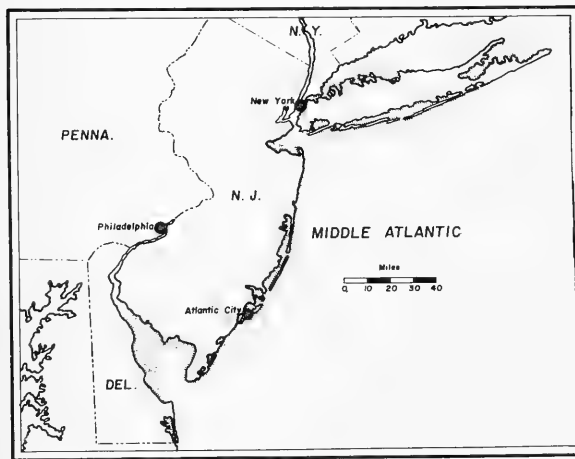


FIG. 6 - LOCATION OF HARD-CLAM FISHERY IN MIDDLE ATLANTIC STATES SHOWN BY STIPPLED AREAS.

Until about fifteen years ago Shinnecock and Great South Bays were the most consistent clam-producing areas, but in more recent years clams have been found in nearly every bay or cove on both north and south shores.

The opening of the intra-coastal waterway around 1930-31 with channels to harbors for the coastal towns (Babylon, Bay Shore, Lindenhurst, etc.) was followed by greatly increased clam production. It is the general opinion of local dealers

and watermen that increased salinity tripled the clam-producing area of Great South Bay. Eel grass began to disappear about 1931, and also is believed to have increased the clam-producing bottom by permitting good circulation of previously choked shallow flats.

Fishermen report sets are not regular, but frequent enough to maintain a good, constant supply of clams. The most recent heavy set appearing in the fishery occurred in 1941. This set was good along both north and south shores, with the result that the north shores are at present more productive than ever.

Dealers in the eastern part of Long Island (Orient Harbor, Peconic Bay, Shinnecock Bay, and Moriches Bay) reported depletion of clam stocks and believed overfishing and failure of setting to be the principal causes. This apparent depletion is probably not as serious as the dealers reported. Two influences are present which can produce a reduction in yield without actual depletion. First, fewer men are employed in the fishery, resulting in lower production. The second influence is the inability of the individual dealer to compete as effectively as in the past for the limited supply of clams. The consistently higher prices which have prevailed for the past several years and the proximity of the New York market have lured many more small buyers into the business. These small buyers can operate with low overhead, and can therefore pay a slightly higher price than the established companies.

Further west on Long Island, dealers reported the fishery to be in excellent condition. They did not recognize any depletion, and although some of them believed that there are fewer fishermen in the business, they felt this is due to lack of recruitment rather than a shortage of clams.

Dealers believe pollution is more serious than depletion in New York. State health authorities have closed a number of productive areas on Long Island because of sewage pollution. Some of these are closed all year; others are closed only during the summer months when the influx of tourists increases the sewage problem. The State conducts extensive transplanting projects to reclaim clams from areas closed because of pollution. The reclamation is mandatory and consists of supervised removal, sale, and replanting of the clams in approved waters. Usually the clams are sold at about one-half the current market price, but are abundant enough to make the work profitable to the fishermen.

Another type of pollution is becoming increasingly serious in southern Long Island, and in time may have very damaging effects. A number of duck farms on the shore of Moriches Bay discharge large quantities of duck excreta into the water. This material is said to increase the phosphate content of the water and when prevailing easterly winds during the summer carry this water into eastern Great South Bay, blooms of a *Chlorella*-like organism frequently occur. Unpublished results of studies conducted by biologists working for shellfish companies have reported that the organism becomes sufficiently abundant to clog the gills of clams and inhibit feeding, resulting in "poorness" and a reduced yield in shucking. This problem has not seriously affected the Great South Bay fishery, although canneries, buying for the greatest possible yield in shucked meats, will occasionally buy elsewhere when these clams are in poor condition. The restaurant and raw-bar trade for the smaller, higher-priced clams is unaffected. A complete biological and hydrographical survey of this problem was undertaken in 1949 through cooperative efforts of the State of New York, the Woods Hole Oceanographic Institution, and dealers in the affected area. Preliminary reports on this study are being prepared, and are expected to be released in the near future.

Marketing was not reported as a serious problem by any of the dealers interviewed on Long Island. The proximity of the New York market makes it the best outlet, and most Long Island clams are shipped there, where they may be sold and reshipped. Some, however, are shipped directly to western New York State, Connecticut, and to more distant markets in Maryland, Pennsylvania, and Ohio.

Tabular and graphic data already presented have shown New York ranks first in hard clam production, and it appears that the State's clam resources are in no immediate danger of overexploitation.

NEW JERSEY

LOCATION OF THE FISHERY: Hard clams are caught along almost the entire coast from Sandy Hook Bay to Cape May. Barrier beaches and islands shelter nearly all of the shore line, and clams occur abundantly in the harbors and bays behind these barriers.

According to some of the dealers interviewed, New Jersey's most productive clam grounds extend from the southern part of Barnegat Bay to Cape May, and Fish and Wildlife Service records of the catch by counties for the period 1931-47 support this idea. The best areas are Little Egg Harbor and Great Bay.

GEAR AND METHODS: With the exception of local modifications of dredges and rakes, the gear employed is similar to that used in New York, and is listed below in descending order of production:

1. Tongs.
2. Rakes include bull rakes; jig rakes, which are simply bull



FIG. 7 - BULL RAKES ARE EQUIPPED WITH SECTIONAL STALES OR HANDLES FOR FISHING IN WATER 20 TO 25 FEET DEEP.

rakes with sectional handles composed of 5-foot lengths of steel pipe; and short-handled rakes used in shallow areas.

3. Dredges of two types are used. One similar to that described for the Massachusetts fishery may legally be employed only on private grounds. The other, a gang-rig, consisting of three or four short-handled bull rakes fastened to towing lines, is operated from sail boats in public waters.

GENERAL CONDITION OF THE FISHERY AND PROBLEMS: Fish and Wildlife Service catch records for New Jersey indicate no depletion in the State's hard-clam resources. In fact, 1948 was considerably above the average annual production for all years since 1931. Dealers, however, reported a decrease in the supply of clams, especially those of smaller size, and little evidence of a successful recent set. All of the men interviewed who believed depletion has occurred, felt that overfishing and failure of setting were the principal causes.

Some of the fishermen were more optimistic about the condition of the industry, and felt that if small clams are somewhat more scarce than in recent years, it is a temporary problem which has occurred periodically in the past. Successful sets are said to occur only occasionally, but support the fishery for several years. Temporary scarcity of small sizes may occur between the periods of successful setting, but this condition is not believed to be indicative of a permanent decline in the fishery.

Marketing presents only a minor problem in New Jersey. There is a constant demand for small clams to be served as "half-shells" or "steamers," particularly during the late summer when clamcakes are most popular. The demand is so great for very small "steamers" in some localities that a considerable amount of undersized clams are taken, and in some areas this illegal fishing is considered a contributing factor in the apparent depletion. Canneries provide a lower-priced outlet for medium and large clams which are used in preparing chowder, minced, and canned clams.

The principal markets for New Jersey clams are in New York, Pennsylvania, and Ohio. Many dealers maintain leased beds on which they hold clams bought during periods of depressed prices on glutted summer markets. These men have found that bedded clams are subject to high mortality if held for more than one season unless planted more thinly than is desirable for easy recovery. Usually fishing is reduced during the winter, and demand exceeds the supply, so the bedded clams may be probitably sold later in the same year in which they were purchased.

Pollution is a problem in only a small portion of the clam-producing areas of New Jersey, and most of it occurs in the less productive northern part of the coast. With the exception of areas near Atlantic City and Wildwood which are closed during the summer when the population is greatly increased by vacationists, the shores of the most productive bays and harbors are so sparsely populated that sewage pollution is no problem.

Apart from the reports of dealers cited previously, there is little evidence of depletion of New Jersey clam resources. Production has been at a very high level for the past several years, and unless increased market demands intensify the fishing effort, it seems unlikely that depletion from overdigging will occur.

DELAWARE

The clam-fishing grounds of Delaware are very limited, and the production, when compared to New York and New Jersey, is so small as to be almost insignificant. The western shore of Delaware Bay in the vicinity of Little Creek supports a dredge fishery which accounts for the major part of the production, and the sheltered waters of Rehoboth Bay and Indian River Bay maintain a very small tong-fishery.

Dredges are the only gear used in the Delaware Bay fishery, since the water is too rough for the small boats used by tong-and-rake fishermen. The dredges are simply modified oyster dredges equipped with teeth from 6 to 9 inches in length.

The clam-dredging fishery, which accounts for almost the entire catch in Delaware, developed as a sideline of the oyster business of Delaware Bay. Boats operated in the Little Creek area dredge small quantities of clams from privately-leased oyster beds, but their largest catches are taken from adjacent natural grounds. Ordinarily, clam fishing stops at the end of the oyster season because the price of clams is lowest during the summer, and they must be sold promptly to avoid loss by spoilage. Good market conditions in 1949 and 1950, however, have encouraged some of the dredgers to continue operations during the summer. No effort has been made to maintain holding beds, since dredging is typically a winter fishery, and mortality is high in winter plantings, according to dealers.

Almost all of the dredged clams are large enough to be used by canneries, since the 2½-inch rings used in the dredge pockets allow most small clams to escape.

Clam production in Delaware Bay has been increasing steadily for about three years. Dealers interviewed reported 1950 catches at an all-time high level, and believed the last similar peak of production occurred in about 1932.

The Indian River and Rehoboth Bay areas were described by local shellfish dealers as unproductive when compared with Chincoteague Bay, which lies a few miles south. Only about seven men in the vicinity of Oak Orchard dig clams commercially, and the largest individual shipper in the area handles only about 2,500-5,000 clams per week. A State law limits a fisherman's daily catch in the Indian River to 1,000 clams, but the scarcity of clams makes it difficult to reach this limit.

There seems to be no problem of marketing the available supply, and no evidence of depletion. The supply is limited to a small area, and is simply not great enough to maintain a large fishery.

Pollution is not serious with respect to the Delaware clam fishery, since the limited areas in which fishing is profitable are free from pollution.

It appears that the fishery of Delaware is being exploited to nearly its fullest extent. Continuation of dredging through the summer may increase production, but if the clams are cyclic in abundance, the particular size groups in which the dredges are most effective will probably be diminished until another successful period of recruitment occurs.

MARYLAND

LOCATION OF THE FISHERY: Although Pocomoke Sound, located in the southeastern part of Chesapeake Bay yields small quantities of clams, nearly the entire catch comes from the protected bays on what is locally called the sea side of Maryland. Chincoteague, Sinepuxent, Assawoman, and Isle of Wight Bays form a continuous body

of water along the entire east coast. The whole area is very shallow, rarely exceeding 12 feet in depth at high water, and the bottom is largely composed of soft, sandy mud, with scattered areas of shell formed by natural oyster beds.

GEAR AND METHODS: With the exception of small quantities taken by dredges working on the lower Chesapeake oyster beds, tongs and rakes account for the entire catch of clams in Maryland waters. Rakes are used principally in the summer when fishermen can wade and tread clams, or locate them by "signing" at low tides when the bottom conditions are right. This method is used by skilled fishermen who can recognize the "sign," which may be a mound, depression, or any hole in the bottom indicating the position of the clam. Tongs, which produce about the same as rakes, are used in both summer and winter in deeper water, and are particularly effective on the natural oyster beds where clams are abundant.

GENERAL CONDITION OF THE FISHERY AND PROBLEMS: Catch records for the period from 1931-48 show a steady increase in production, with only occasional minor regressions. Although somewhat less than 1947, the catch for 1948 is still well above any other preceding year.

Depletion was considered a major problem only in the Chesapeake Bay clam fishery. Dealers in Crisfield reported that formerly productive beds in Pocomoke Sound have become so depleted during the last fifteen years that they now produce virtually no clams.

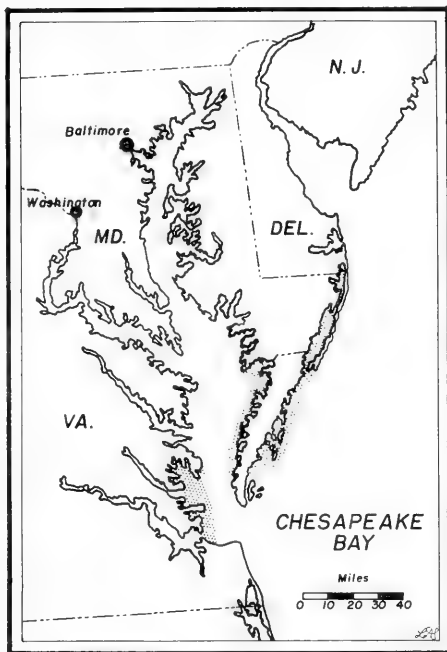


FIG. 8 - LOCATION OF HARD-CLAM FISHERY IN CHESAPEAKE BAY STATES--STIPPLED AREAS.

Members of the Maryland shellfish industry who were interviewed almost universally agreed that marketing is the major barrier confronting the Maryland clam fishery. The greater volume of production in New England offers serious competition to a year-round market. Nearly all Maryland dealers depend largely on "bedding"--clams bought at low prices during the summer and on the re-sale of the clams during the winter. In normally severe winters, the New England fishery is considerably restricted, and "bedding" is quite profitable. A number of dealers stated that they have bought and held clams from New York, New Jersey, Rhode Island, and North Carolina to augment their local supply. Mild winters during the last few years have made this practice risky, and several dealers reported that the poor winter market had forced them to reduce or abandon "bedding" operations.

The outlet for Maryland clams is almost entirely out-of-state. Regular markets are found in New York, Pennsylvania, Ohio, Florida, and even Texas. The peaks of

demand occur during late summer for small clams used in clambakes, and during the winter for large chowder clams.

Two firms within the State produce canned chowder, and very recently another company has begun freezing clams with satisfactory results.

Pollution presents no problem to the Maryland clam fishery since most of the clam-producing area of the Eastern shore is sparsely populated.

The steady increase in production, despite a reported reduction in fishing effort, indicates that the industry is growing even though marketing problems are severe. These problems may be overcome with the development of efficient techniques of freezing and processing. Long-distance shipment at minimum cost could provide new outlets, and offer better competition to the New England clam fisheries.

VIRGINIA

LOCATION OF THE FISHERY: Virginia's hard-clam fishery is centered along the eastern peninsula. The sheltered bays from Cape Charles to Chincoteague Bay are most productive, but considerable quantities are also taken from the lower Chesapeake Bay.

The western shore of Chesapeake Bay from Mobjack Bay to Cape Henry is also quite productive. Broad shallow flats cover much of the area, and small coves and creeks provide excellent holding grounds.

GEAR AND METHODS: Tongs and rakes are the most productive gears, and dredges account for only a small part of the catch. Hand tongs are most numerous, but in some areas in Chesapeake Bay the use of power-operated patent tongs is permitted, and in those areas, this gear is very important. Patent tongs are exactly the same in design as hand tongs, except that the shafts are shorter, and made of iron instead of wood, and that the head or basket is much larger. Wire ropes replace the shafts, but the tongs are worked into the bottom by the same scissor-like action. This gear was originally developed for use in oyster fishing, but has proved very efficient in catching hard clams.

The type of hand-operated gear varies with the season. In winter, tongs are used almost exclusively, while in the summer rakes are used very extensively by fishermen who take clams by treading and "signing."

No dredges are licensed for clam fishing in Virginia, and the catches listed are taken incidentally in dredging for oysters and crabs. Clams are seldom dredged from privately-leased holding grounds, principally because these grounds are often in very shallow areas.

GENERAL CONDITION OF THE FISHERY AND PROBLEMS: Although the annual catch during the period from 1944-48 was not as high as in previous years since 1931, the lower production should not be interpreted as evidence of a serious decline or depletion. Only one of the many dealers interviewed believed that the stocks of clams were reduced. In all other instances, overproduction and marketing were considered the most serious problems.

The planting of clams on privately-leased grounds is one of the most important parts of the industry. It is very difficult for Virginia dealers to compete profitably with the great production from the New England and Middle Atlantic States. There is a steady year-round demand, but prices are depressed during the summer

when clams are plentiful and Virginia dealers consider winter trade most profitable. In severe winters when New England clam fishing is restricted, Virginia



FIG. 9 - TONGS ACCOUNT FOR OVER 60 PERCENT OF THE ANNUAL HARD-CLAM CATCH.

dealers can profitably sell clams bought during the previous summer and held on leased beds. Unusually mild winters during the past few years have made holding clams unprofitable. A number of men reported serious losses from holding clams for two years. The heavy losses from holding beds reported by some dealers may have been due to overcrowding, and the development of better farming techniques might be of great value during periods when depressed prices necessitate long holding periods.

Local markets consume some of the catch, but Pennsylvania, New York, and Ohio, and even Florida, provide the principal outlets. There is at present no large-scale effort being made to process clams, and practically all are sold in the shell. There is only a very limited local market for shucked clams, principally for restaurant and retail trade.

Pollution occurs only in a comparatively small area around Norfolk and is not a serious problem. State health laws permit the sale of clams from contaminated water, if they are transplanted to a pure area and held for one month.

Predation is usually not a serious problem, but occasionally skates invade the holding beds in the Chincoteague Bay area. One man reported the loss of 600 bushels of small clams in two nights during 1948, and said it was necessary to fence his holding beds to exclude these predators. Fortunately, skates do not come into the Bay every year, and the 1948 invasion was the first serious attack to occur in five years.

NORTH CAROLINA

Hard clams are found in nearly all of the sheltered coastal waters of North Carolina, but the commercial fishery is centered principally in Carteret and New Hanover counties. Statistics of the Service reveal that smaller quantities are also caught in Brunswick, Dare, Hyde, Onslow, and Pender counties.

Rakes, used by fishermen wading in shallow water or on beds exposed at low tide, account for almost the entire hard-clam catch. Tongs are used, but except in Carteret County, these are so few that their contribution to the catch is negligible. Dredging began about December 1949 in Carteret County and now accounts for almost the entire catch of this county.

The opinion of dealers and biologists interviewed in North Carolina was that the principal problem facing the hard-clam fishery is market development, although some concern was expressed over the effect of the new dredge fishery.

Clams are abundant, but the distance to markets makes transportation very costly. Most of the clam diggers work only part time, and turn to other fisheries whenever it appears more profitable.

It is possible for southern clam diggers to work during winter months when weather curtails the New England fishery, and North Carolina men find the winter season profitable. Maryland and Virginia have similar advantages of weather, however, with a further advantage of being closer to the northern markets.

"Bedding" of clams bought cheaply during the summer is a common practice, but is considered risky, particularly during the mild winters of the past several years. In "bedding" as in the fishery for native clams, Virginia and Maryland offers sharp competition.

Contracts with northern canneries for large chowder clams provide one good outlet, and the technique of freezing shucked meats and liquor separately had reduced transportation costs by increasing the pay load. Only a few dealers ship directly to northern markets. Most clams are sold in the shell through dealers in Virginia and Maryland.

Pollution and predation are of no importance to the North Carolina fishery. Fishermen and dealers believe the supply of clams greatly exceeds the demand at present. It seems improbable that the resource will be fully exploited unless the market is expanded to offer profitable full-time employment to fishermen or unless a more intensive dredge fishery develops.

SOUTH CAROLINA

Catch statistics indicate that the hard-clam fishery is concentrated in Horry and Georgetown Counties, but fishermen insist that Charleston and Beaufort Counties also have extensive clam beds. A sea-food producer of Beaufort reported that the hurricane of August 1940 exposed a three-quarter mile bed at Trenchard's Inlet "on which clams were so thick that there was not a hand's breadth between them."

Rakes account for most of the catch, a considerable part of which is dug on exposed flats at low tide. Although dredges used in the oyster fishery also catch a few clams, the catch is insignificantly small. Dredge production is limited further by a State law which prohibits dredging for clams in less than 12 feet of water.

Marketing is apparently the greatest problem in the hard-clam fishery of South Carolina. All of the dealers and conservationists interviewed agreed that hard clams offer an almost unexploited source of wealth, but the problem of finding a profitable outlet has retarded the development of the fishery. Only during

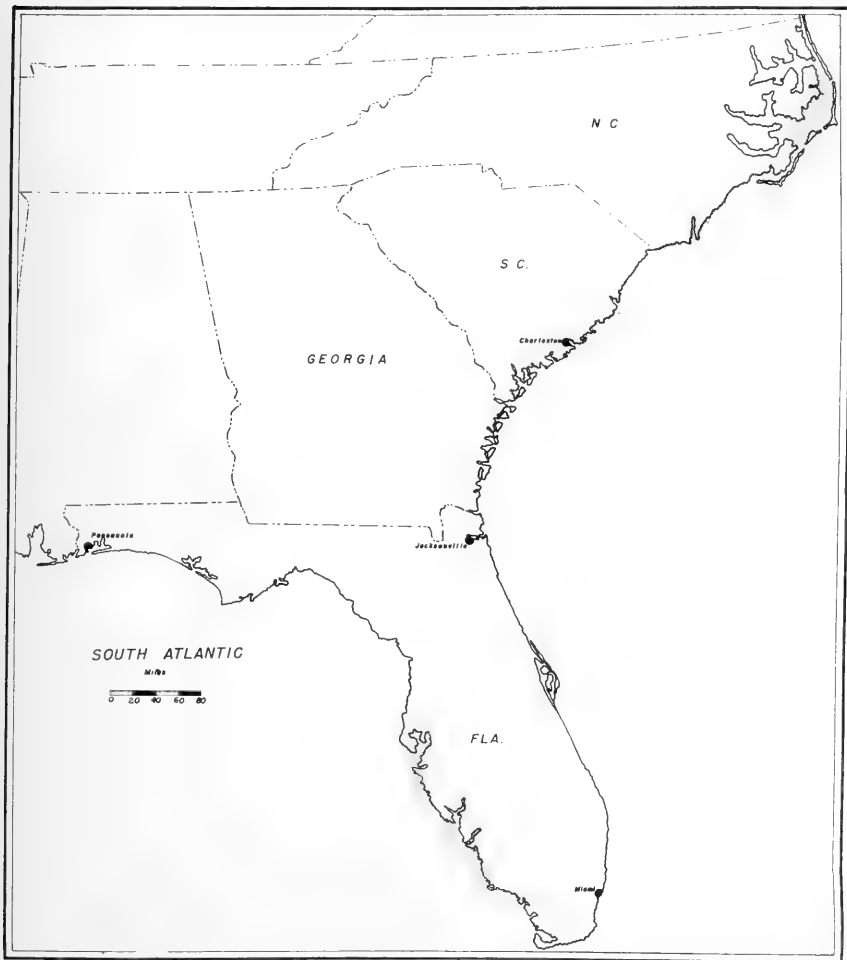


FIG. 10 - LOCATION OF HARD-CLAM FISHERY IN THE SOUTH ATLANTIC STATES SHOWN BY STIPPLED AREAS.

severe winters, when New England waters are inaccessible, can the Southern clams be dug and marketed at a price high enough to defray the expenses of packing and shipping to northern markets.

The oyster business is of much more importance, and extensive individually-leased areas are devoted to oyster farming. Holders of these leases are not greatly concerned with the development of a clam fishery, and at present there is little interest in clam farming. Clams occur on the leased oyster beds but are more abundant on public grounds.

South Carolina has 11 laws relative to clams some of which inhibit the development of an industry. One law specifies a closed season between May 1st and August 1st, which prevents marketing of clams during the period of peak demand from the raw-bar and clam-bake trade. Another law prohibits the out-of-state shipment of clams in the shell. This second law prevents shell-stock shipments to Northern canneries which use large quantities of clams for chowder or minced clam products. Local consumption is small, and unless an out-of-state outlet is found and a profitable method of shipping developed (perhaps as a frozen product), the industry shows little promise of developing.

GEORGIA

There is no commercial clam fishery in Georgia. Clams are found in most of the intra-coastal waters, but they are reported taken only for home consumption, and are believed not to be sufficiently abundant to support a fishery. The Service's records show no clam catch since 1932, when a total of 600 pounds was taken commercially.

There is virtually no local demand, and the distance from northern markets presents a serious barrier to the development of a fishery.

The introduction of efficient freezing techniques might be of value in developing a market, but at present there is little evidence that a fishery for hard clams can be built up in Georgia.

FLORIDA

LOCATION OF THE FISHERY: Clams are found along both coasts of Florida, but the greatest concentrations are on the west coast from Ten Thousand Islands to Tampa Bay. The beds in this area are reported to extend from Shark Point to Coon Key Light, a distance of about thirty-five miles. The inner edge is about one-eighth mile from shore; the outer edge about five miles. The total area of the beds is at least 150 square miles. The shore line slopes very gradually, and the depth 4 to 5 miles offshore is less than 12 feet in many places.

GEAR AND METHODS: Rakes, hoes, and grabs are the only types of hand-operated gear, and are few in number. Reliable records of the number of units of these gear are not available, but on the basis of interviews it may be stated that the number of men is small, compared to the numbers employed in other fisheries. Clam digging is usually a part-time occupation pursued when other fishing is unprofitable.

A conveyor-belt dredge was introduced into the Ten Thousand Islands clam fishery about 1913, and this type of dredge was used, with some modification and improvement, until 1947 when operations became unprofitable. All clams taken by the dredge were shucked and used for canned chowder, minced clams, and clam juice.

The dredge was essentially a large wooden scow, about 30 by 80 feet, with a rectangular opening in the bottom through which the dredge belt operated. Clams

were washed from the bottom by high pressure jets of water, and brought to the surface by a conveyor belt. The earlier models of this dredge were self-propelled. An anchor was set and the dredge was allowed to drift or was towed to the end of the cable--a distance of about 1,000 feet. The dredge then hauled itself back to the anchor by means of a winch. The scoop of the dredge was about $3\frac{1}{2}$ feet in width, and a single set could therefore cover about 3,500 square feet. It was reported that the dredge operated 24 hours per day and could make about eight sets.

The most recent modification of this device is smaller in size, measuring 16 by 40 feet, and can operate in shallow water. It dredges a 24-inch swath, and may either be operated on an anchor cable, or towed by a power boat. Facilities are also provided for shucking and refrigeration, thereby minimizing the expense for shore installations needed to pack the clams.

The regular Fall River dredge used in the New England fishery has been tried in Florida, but although good catches were reported, it has never been used commercially.

GENERAL CONDITION OF THE FISHERY AND PROBLEMS: The status and potential production of the Ten Thousand Islands clam beds were reported in 1920, 1938, and 1943.

The first report, prepared by W. C. Schroeder of the U. S. Bureau of Fisheries, emphasized the great abundance of clams. The second report was by J.R. Kelly of the Florida State Board of Conservation who attempted to determine whether dredging operations were damaging or destroying the clam beds. This report contained affidavits obtained from a number of local watermen who claimed that serious depletion had occurred in the years the dredge has been operating. Overfishing, breaking of shells, smothering, removal of grass, and destruction of the habitat were cited as the principal damaging effects of the dredge.

In 1943, C. H. Chilton, a fishery marketing specialist for the U. S. Fish and Wildlife Service, visited the area and estimated the potential production of the fishery to be almost unlimited. He reported an estimated abundance of one bushel of clams per six square yards dredged.

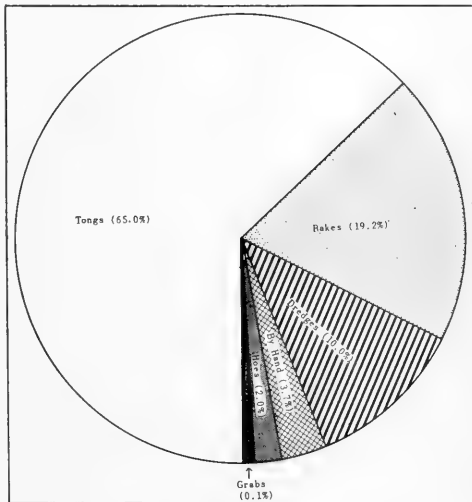


FIG. 11 - GEAR USED IN HARD-CLAM FISHERY MAINE TO FLORIDA SHOWN IN PERCENTAGE OF AVERAGE CATCH 1944-48.

The contradictory nature of these reports makes analysis of the available catch records for the area somewhat difficult. Service statistics are available by county and gear for only seven years between 1931 and 1947, but they do show a somewhat smaller catch for the Ten Thousand Islands area in 1947 than in any preceding year except 1934.

The men interviewed during the 1950 survey (upon which this report is largely based) felt that serious depletion had occurred, but that it was the result of an unusual natural mortality, and not the result of dredging.

One fisherman sampled the area with a Fall River dredge during 1948 and found clams sufficiently abundant to build another conveyor-belt dredge. In November 1949, he found that almost the entire population of clams had died. In eight days of dredging from Coon Key to Wood River, he found only eight live clams; the remainder of his catch consisted of empty shells. Areas untouched by previous dredging yielded only dead clams.

The annual catch of the dredge from 1943 to 1946 was 30,000, 50,000, 78,000, and 25,000 bushels. In the year 1947, clams were so scarce that operations were halted. It is very difficult to trace and evaluate the trends of the Ten Thousand Islands fishery. Although intensive dredging may have contributed to a reduction in the stocks of clams, the fishermen we interviewed believed that a destructive natural phenomenon also contributed to the depletion.

At present there is no fishery reported in the area, and unless natural restoration rebuilds the population to its former abundance, it is doubtful whether any further effort will be made to develop a clam industry in the Ten Thousand Islands.

Interviews with dealers and conservation research personnel indicated that only limited stocks of clams have ever been found outside of the Ten Thousand Islands. Sufficient numbers for home consumption occur in many areas along both coasts, but commercial fisheries have been attempted in only a few places.

A small fishery existed at one time near Matanzas Inlet, and although a small stock of clams is still present, no effort is made toward commercial harvesting. Limited quantities occur in the inland waters from Edgewater through the Indian River, but there is no fishery. Clams are reportedly less abundant than before the opening of the intra-coastal waterway.

Charlotte Harbor and adjacent inshore waters near Englewood supported a small fishery, but during the last few years heavy mortalities have so depleted the stocks that fishing is no longer profitable.

Lower Tampa Bay provides a limited supply for local use, and a few large clams are taken near Clearwater. The upper limit of clam production is in the area of Cedar Key, where clams were reported to be fairly plentiful, but no attempt has been made to develop a fishery.

Florida dealers are faced with serious problems of marketing. With the exception of Miami, there is little or no demand except in the tourist season, and even then northern clams present a barrier to local marketing. Florida clams were reported by some dealers as being too large, too full of sand, and too difficult to ship without heavy mortality. These dealers find a more dependable supply and a better product from northern markets. One dealer reported buying 2 to 3 tons per week from northern markets during the November-March tourist season.

At present there is practically no hard-clam fishery in Florida. Restoration of the Ten Thousand Islands stocks might offer an opportunity for the development of a market for shucked frozen clam meats to be used by northern canneries, or perhaps for locally-canned clam products. It is doubtful, however, whether the industry could ever be developed sufficiently to offer effective competition to the big northern clam resources.

CONCLUSIONS

The hard-clam fishery of the Atlantic Coast presents no picture of general depletion such as that observed in the soft-clam fishery. Stocks of hard clams in most areas are adequate and fishermen and dealers are often worried more about demand than supply. Local exceptions to this statement are found--the most notable being the disappearance of the hard clams in the Ten Thousand Islands area in Florida. This area, once described as the greatest bed of hard clams in the country, now supports no commercial fishery. The cause of the disappearance of hard clams in Florida is a worthy subject for biological research.

The intensive tong-and-rake fishery in Rhode Island, together with the possibility of using more efficient power dredges, causes concern over the ability of the clam population to withstand increased fishing pressure. The Service's investigations in this State are designed to determine the productivity of Greenwich Bay in terms of the number of quahugs which can safely be removed each year. These studies present a unique opportunity to observe a commercial fishery before it has been dangerously depleted.

Pollution is a serious problem only in Massachusetts, Rhode Island, and New York. Both Massachusetts and New York salvage their clams from polluted waters by transplanting them to clean beds for a specified time before marketing. Effective disposal systems would reduce sewage pollution, enlarge the fishing area, and increase clam production.

Marketing was reported to be an important problem by all states from Maryland to Florida. These states must compete with the Middle Atlantic and New England States, but are handicapped by their distance from the centers of population.

Severe winter weather restricts the northern diggers, but southern fishermen seldom face this problem and usually find winter fishing profitable. Mild winters during recent years have permitted digging most of the year in New England and have thereby reduced sales from the South.

Another factor reducing the market for southern clams is the latter's lower yield of meats per bushel as compared with northern clams. Catch statistics indicate that hard clams from the New York-Maine area average about 11.5 pounds of meats per bushel; New Jersey and Delaware about 9.0 pounds; whereas Maryland-Florida clams averaged only 7.5 pounds per bushel. It is apparent from these figures that southern clams must be obtainable at a lower price to compete with those from northern waters.





Progress on Projects, September 1952

REFRIGERATION: Freezing Fish at Sea, Defrosting, Filleting, and Refreezing the Fillets: The research trawler Delaware completed test cruises 14 and 15. Approximately 21,000 pounds of scrod haddock were caught on Georges Bank and were brine-frozen aboard the vessel. These fish were placed in commercial cold storage and will be used for further testing by the laboratory. (Boston)

* * * * *

Freezing and Storing Alaska Shrimp and Dungeness Crab: Organoleptic tests were made on seven experimental packs of frozen Alaska shrimp after 31 weeks of storage at 0° F. One lot of commercially-packed frozen shrimp was included for comparison. The purpose of the project is to determine the effect of processing and packaging methods on the flavor, texture, shrinkage, and keeping quality of the shrimp meats. The 31-week examination was made during the month and the experimental work on this phase of the project was concluded. Some of the tentative conclusions were:

1. The texture of cooked Alaska pink-shrimp (Pandalus borealis) meats varied widely within any given lot.
2. The toughening of cooked pink-shrimp meats occurred during the initial processing and did not increase materially during frozen storage at 0° F.
3. Flooding the cooked shrimp meats with brine (2-percent salt solution) prior to freezing and storage produced a product more tender than the shrimp meats packed dry in the usual commercial manner.
4. Pink-shrimp meats cooked from 1 to 4 minutes in 10-percent brine prior to packaging and freezing apparently had absorbed an excessive amount of salt as judged by taste testing. The flavor, from the standpoint of salt content, of shrimp meats cooked 1 minute in 10-percent brine and then flooded with 2-percent brine prior to freezing was satisfactory, as was the flavor of the shrimp meats cooked 1 minute in 5-percent brine.
5. Use of monosodium glutamate (3 percent by weight) in the frozen dry-packed shrimp did not improve the flavor or keeping quality of the product.
6. The storage life of frozen, dry-packed Alaska pink shrimp meats packed in moisture-vaporproof containers is from 6 to 8 months at 0° F. The storage life of frozen shrimp meats packed in dilute brine is greater than 8 months. (Ketchikan)

* * * * *

BYPRODUCTS: Vitamin Content and Nutritive Value of Fishery Byproducts: Niacin and vitamin B₁₂ assays of samples of 23 lots of pilchard meal and 1 lot of tuna meal were completed. The niacin content of the lots of pilchard meal ranged

from 61 to 125 micrograms per gram of meal on the moisture-and-oil-free basis, and the vitamin B₁₂ content from 0.20 to 0.38 micrograms. The niacin content of the lot of tuna meal was 174 micrograms per gram of moisture-and-oil-free meal; the vitamin B₁₂ content was 0.26 micrograms. (Seattle)

* * * * *

ANALYSIS AND COMPOSITION: Composition and Cold-Storage Life of Fresh-Water Fish: The proximate composition was determined for four additional samples of Lake Michigan chub and of 16 samples of sheepshead from the upper Mississippi River. The results are presented in the following table:

Composition of Edible Portion of Lake Michigan Chub and Sheepshead

Species	Sample No.	Length Centimeters	Weight Grams	Fillet Yield Percent	Proximate Composition			
					Moisture Percent	Fat Percent	Protein Percent	Ash Percent
Lake Michigan chub (<i>Leucichthys</i> sp.) ^{1/}	13	22	110	45	79.2	8.10	13.8	0.84
	14	20	85	33	78.7	4.38	15.6	1.04
	15	21	95	32	80.9	3.92	15.3	0.97
	16	20	88	37	75.1	9.18	14.5	0.77
Sheepshead (<i>Aplodinotus</i> <i>grunniens</i>) ^{2/}	1	34	520	31	77.1	6.93	19.4	1.22
	2	33	512	35	73.6	8.21	18.7	1.04
	3	31	412	32	74.1	7.00	19.1	1.20
	4	28.5	320	30	74.1	6.43	19.1	1.09
	5	27.5	280	31	79.0	3.48	18.6	1.25
	6	27.5	305	34	76.0	4.73	19.3	1.25
	7	30.5	380	34	75.3	7.90	18.1	1.12
	8	29	395	34	69.4	9.92	18.2	1.07
	9	35	635	38	68.2	11.35	17.9	1.04
	10	36	735	35	70.4	13.09	17.2	0.99
	11	34.5	600	33	73.7	7.89	17.7	1.08
	12	31.5	445	30	77.0	4.81	18.6	1.15
	13	28	330	32	72.1	8.74	17.6	1.02
	14	28	310	33	74.1	8.25	18.2	1.00
	15	26.5	235	32	76.2	3.80	19.3	1.14
	16	33	410	26	80.0	1.87	17.6	1.10

^{1/}CAUGHT IN JULY 1952. Eviscerated with heads on (drawn).

^{2/}CAUGHT IN MAY 1952. ROUND (WHOLE) FISH.

(Seattle)



Technological Program Changes

Three new projects were initiated at the Seattle Fishery Technological Laboratory: (1) the cold-storage life of Pacific Coast halibut and (2) salmon, and (3) freezing, thawing, and glazing salmon for canning. This information is needed to provide the technical data to substantiate the changes recommended by the fishing industry in the Federal specifications for fresh and frozen fish and for canned salmon.

REFRIGERATION: (1) Cold-Storage Life of Halibut: The objective is to determine the length of time frozen halibut (*Hippoglossus stenolepis*) will remain in good condition in commercial cold-storage warehouses. Frozen and ice-glazed dressed whole halibut were obtained at three commercial fish-packing plants. The samples

were handled in the usual commercial manner by placing the fish in paper-lined boxes and storing at 0° F. or below. At intervals of storage, steaks will be cut from the dressed fish and the steak samples glazed, packaged, and further stored at 0° F. These whole dressed fish and steak samples will be examined organoleptically by a qualified taste panel at periodic intervals to determine their keeping quality.

(2) Cold-Storage Life of King and Silver Salmon: The objective is to determine the length of time frozen king (*Oncorhynchus tshawytscha*) and silver (*O. kisutch*) salmon will remain in good condition in commercial cold storage. Drawn (heads on) king and silver salmon were plate-frozen, ice-glazed, and stored in paper-lined boxes at about 0° F. At periodic intervals steaks will be cut and the steak samples will be glazed, packaged, and stored. The dressed fish and steak samples will be examined organoleptically to determine the cold-storage keeping quality.

(3) Freezing, Glazing, and Thawing Salmon for Canning: At the present time a substantial portion of the salmon caught in certain areas of Alaska are frozen in brine aboard the vessel, and transported to the State of Washington where the frozen fish are thawed and canned. Technological problems on handling the frozen fish have arisen. These affect the quality of the final canned product. The purpose of this investigation is to determine the effect of methods of freezing, holding in refrigerated brine, glazing, and thawing of the salmon upon the quality of the subsequently canned product.

Since this project was initiated after the season for sockeye salmon (*O. nerka*) had closed, the tests for the year will be carried out on sockeye salmon frozen aboard commercial freezer ships. Consequently, no tests during this year are contemplated on methods of brine freezing. Representative samples of brine-frozen sockeye salmon were obtained from a commercial packer. Tests are currently being carried out to (1) determine feasibility of glazing the brine-frozen fish to prevent possible changes during storage, and (2) to determine the effect of various thawing methods on the salt content of the subsequently canned fish.

Project Reviews

FREEZING FISH AT SEA, DEFROSTING, FILLETING, AND REFREEZING THE FILLETS--

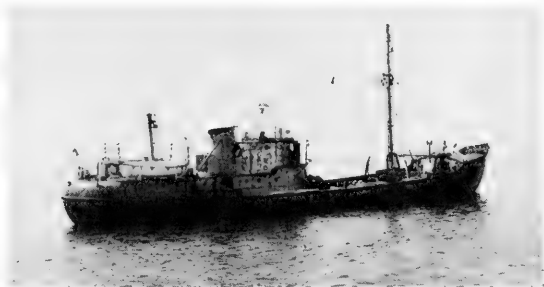
Review for Period December 1950-September 1952

The following is a summary of the over-all status of the project for the period from December 1950 to September 1952, presenting an inventory of the accomplishments, an evaluation of the original objectives in light of more recent and actual operating experiences, and plans for the continuation of research.

RESEARCH TRAWLER OPERATIONS: Vessel: The M. V. Delaware was in a run-down condition when received by the Service in December 1950. Repairs and alterations to the vessel, over and above normal maintenance, during the past 21 months included:

- (a) Complete rebuilding of the main propulsion engine;
- (b) Replacement of the trawl-winch Diesel engine;
- (c) Enlargement and improvement of the galley, and of the forecabin and cabin quarters;
- (d) Replacement of the air-compressor unit.

The vessel's basic fishing equipment was restored to the current New England trawler style by the alteration or replacement of non-standard equipment, including the echo sounder, compass, loran, radar, and heating and lighting system. The deck gear likewise was restored and most of the expendable items replaced, including trawl-winch brake system, trawl warps, trawls, and fish-hoist equipment. The crew (7 fishermen, 1 cook, and 4 officers) were indoctrinated both for government employment conditions and the project's scientific research approach, each a significant departure from their customary commercial fishing-vessel routine.



THE DELAWARE EN ROUTE TO FISHING GROUNDS.

Fishing operations are carried out at approximately half-scale as compared to commercial practice, to allow for proper testing of the refrigeration equipment during the developmental stages. Georges Bank has been the locale for all the test cruises, which average about six days each. The catch landed consisted of iced, gutted fish for control purposes; and the round brine-frozen fish as material for experimental work, quality-control tests, and for sale to commercial firms interested in testing the brine-frozen round fish. Sufficient sales have now been made to demonstrate an active interest in the product and to indicate the handling techniques that may be necessary for a larger-scale freezing-at-sea operation.

Refrigeration Equipment: A total of 15 test cruises have been undertaken, with catches up to 25,000 pounds of whole round fish per cruise. These fish, predominantly scrod haddock, were frozen at sea in sodium-chloride brine and stored in the refrigerated hold of the Delaware. The purposes of the cruises were:

- (a) To obtain a supply of fish frozen at sea for use in the laboratory and pilot plant, and to provide frozen fish to interested commercial processors;
- (b) To study the operation of the experimental refrigeration equipment under working conditions with a view to developing it to the point where similar equipment could be recommended to the industry.

Of special interest has been the operation of the absorption-refrigeration machine. Relatively new to this type of application, the absorption machine is claimed to have certain inherent advantages over the compressor system. Tests of the plant's efficiency, operating costs, and characteristics under full-rated load have been delayed, however, by the low capacity of the brine-cooling evaporator, and we are, therefore, not yet in a position to attest to the plant's performance under full load.

RECENT CHANGES AND ADDITIONS: Since the publication of the report "Freezing Fish at Sea--New England: Part 3 - The Experimental Trawler Delaware and Shore Facilities" (Commercial Fisheries Review, vol. 14, no. 2, February 1952, pp.16-25), in which the vessel installation was described, a number of changes and additions have been made. These are:

- (a) Additional cold-storage space for frozen fish has been provided by construction of an insulated bulkhead located two pen sections forward of the existing

cold-storage room. This new room also is equipped with cooling coils designed to keep the room temperature at 0° F.

(b) A brine make-up and storage tank of 50 cubic feet capacity has been installed next to the brine-freezer tank.

(c) The brine and storage-room coolant (or "antifreeze") circulating pumps were moved from the freezing-tank room to the refrigeration-machinery room to provide more storage space in the former, and to facilitate better maintenance of pumps and motors. The hold cooling coils were split into four parallel banks, one on each side of the center line of the two storage rooms. The flow of "antifreeze" to each bank is controlled by conveniently located valves, providing flexible control of the storage-room temperatures.

(d) Additional refrigeration controls and temperature-recording instruments were installed.

Operating Data and Observations: **FREEZER PERFORMANCE:** It was found that by loading the freezing tank approximately every 105 minutes with about 960 pounds of scrod haddock, the brine temperature rose about 4° F. and was then pulled down close to its original temperature in time for the next loading. Thus, the average freezing rate was about 550 pounds an hour.

STORAGE-ROOM TEMPERATURE: All-night operation of the room cooling system usually lowered the temperature to about 5° F. Opening of the bulkhead door during the storage of frozen fish caused the room temperature to rise five or more degrees, depending on the period the door was open.

HANDLING OF FISH: It has been found convenient to fill nylon mesh bags (flat dimensions 40 x 20 inches) with about 40 pounds of fish on deck, and to slide these bags down a chute rigged from the after hatch to the freezer rotor. In unloading the freezer, the bags are lifted out by hand and passed forward into the storage room where the frozen fish are emptied from the bags into the pens. The bags are then re-used.



REMOVING FROZEN FISH FROM THE BRINE FREEZER ABOARD THE DELAWARE.

FROZEN-FISH STORAGE: Measurements were made of the available space for storing frozen fish in the two refrigerated holds. After deducting working space, machinery (and access) space, and an 18-inch loading space between the ceiling and top of the fish, the net volume of the forward and after holds were found to be 985 cubic feet and 1,705 cubic feet, respectively. Using a factor of 33 pounds per cubic foot for loose-frozen fish, found to apply in loading

large boxes, the carrying capacities of these two rooms are 32,500 and 56,500 pounds, respectively.

Comments on Results: The freezing rate of 550 pounds an hour, about 55 percent of the anticipated rate, can be increased by raising the brine-cooler capacity and by reducing the loss of refrigeration in the freezing room. The first of these measures will also be necessary in order to apply a full load to the absorption machine.

Failure to maintain at 0° F. the storage-room temperature, as originally planned, is attributed to frequent door openings and to the manner in which the ammonia-vapor lines from the two evaporators (i. e., coolers) are connected. Improved fish-handling procedures and a change in piping design, incorporated into the brine-cooler modifications, can be expected to improve the storage-room temperature.

Operation of the present brine freezer, while very effective in transferring heat from fish to brine, is rather inefficient in its man-power requirements. The lack of standing space and headroom over the tank makes handling the fishbags an arduous task. Also, if sufficient fish were caught and frozen to warrant the use of the after-storage room, wherein the freezer is located, the men would be alternately working in the low temperature room and the relatively warm outside air. Their necessarily frequent passage from deck to freezing room and return would throw an excessive load on the room cooling system. These points have been amply demonstrated during the early cruises.

The data given for the present carrying capacity clearly show the need for the utmost efficiency in use of available storage space. Efficient construction of insulated linings and bulkheads is essential, along with the elimination of any equipment in the hold that could be installed elsewhere.

Under the "Pilot Plant and Shore-Processing" section of this report, observations of vessel unloading are noted. The desirability for development of an improved unloading method is indicated by the comparison with fresh-fish unloading rates. The rapid transfer of frozen fish from vessel to cold storage ashore is obviously desirable in maintaining high quality.

Outline of Future Vessel Work: BRINE COOLER: By modification or replacement of existing unit, increase cooler capacity to 20 standard refrigeration tons.

ABSORPTION MACHINE: Run tests to determine the machine's ability to handle rated freezing load, its efficiency, and cost of operation. This will require installation of metering equipment in steam-condensate and boiler-fuel lines.

BRINE FREEZER: Develop brine-freezing mechanism which can be loaded and unloaded at deck level.

STORAGE SPACE: Study the construction of refrigerated holds with a view to improving on the capacity of the existing installation. Considered in the study would be the insulating materials, construction details and materials, and cooling methods.

VESSEL UNLOADING: Develop improved methods and equipment to facilitate rapid unloading and transfer of frozen fish to cold storage.

PILOT-PLANT AND SHORE PROCESSING: The objectives of the Pilot Plant and Shore Processing section of this project as outlined in the original proposals have

been modified and elaborated as the investigations have progressed. Therefore, it might be well first, to summarize the major objectives and then, evaluate the progress made on each. In this portion of the report these objectives primarily within the scope of the laboratory or vessel-operations sections are not considered. Also, several minor incidental objectives are not mentioned.

Outline of Objectives--Original and Supplemental Combined:

A. Pilot-Plant Freezing Studies

1. Variety of freezing methods, possibly suitable for vessel operation.
2. Freezing rates of fish in brine.
3. Ratio of brine to fish necessary for optimum freezing.
4. Effect of different methods of dispersal (agitation) of fish in brine-freezing tank.

B. Pilot-Plant Thawing Studies

1. Factors affecting rate of thawing fish, especially in fresh water.
2. Commercial thawing methods and equipment.

C. Shore-Processing Studies

1. Problems of unloading and storing frozen fish.
2. Problems of handling, scaling, and filleting thawed fish.
3. Effect of prolonged storage of round-frozen fish prior to defrosting and filleting.
4. Fillet and viscera yields from round fish.
5. Changes in weight of fish during thawing.
6. Preparation of steaks from round-frozen fish.

A. Tentatively, at least, the four investigations under "Pilot-Plant Freezing Studies," are considered completed. Final reports on the bulk of the results have been prepared and accepted. One report has already been published ("Freezing Fish at Sea--New England: Part 2 - Experimental Procedures and Equipment," Commercial Fisheries Review, vol. 14, no. 2, February 1952, pp. 8-15), and the second has been accepted for publication ("Part 5 - Freezing and Thawing Studies and Suggestions for Commercial Equipment"--in press.)

The few pilot-plant trials conducted since the submission of these papers have simply confirmed the data and conclusions already reported.

On the basis of the pilot-plant studies, several recommendations were made for the design and operation of a freezing mechanism for the Delaware. In general, these recommendations were followed in the designing and construction of the equipment first installed on the vessel. When the equipment was operated, and as the mechanical details were modified, the pilot-plant staff was frequently called upon to supply data and advice on the effect of various factors on the rates of freezing of fish.

It is now apparent from actual operation of the equipment that major modifications are desirable to cut down on the labor below decks. The proposed changes, which would permit the bulk of the operations to be conducted on deck, are still in accordance with the initial recommendations. However, if possible, this time the moderate-size pilot-plant scale models of the freezing equipment should be given thorough trial before the final equipment is constructed and installed on the vessel.

B. The original objectives under the "Pilot-Plant Thawing Studies" have been considered from most of the major angles. A moderate amount of data has been accumulated on the factors affecting the thawing of fish in fresh water. Satisfactory

methods and equipment for commercial use have been devised. The data and recommendations are in the two reports already cited. Some of the practical information on equipment and methods was included in a short report, "Technical Note No. 21--Equipment and Procedure for Thawing Fish Frozen at Sea" (Commercial Fisheries Review, vol. 14, no. 5 (May 1952), pp. 18-19), which was based largely on the second of the larger reports.

Since submission of the above reports, the experimental work has simply tended to substantiate the conclusions and recommendations already made.

There are certain factors that have not been adequately considered and further experiments are planned for study:

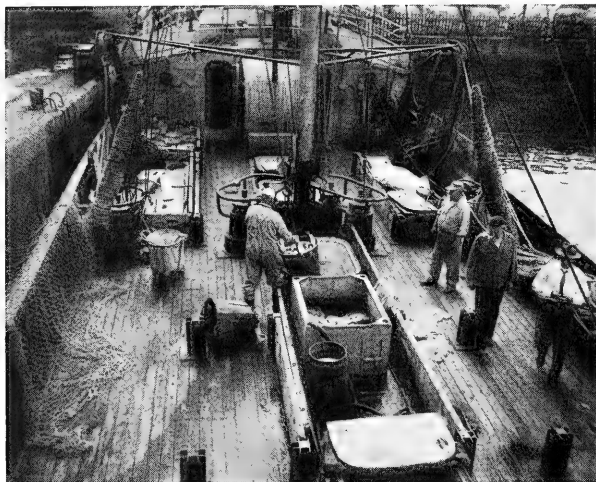
1. Methods of thawing frozen fish other than in water.
2. The effect of very rapid thawing of frozen fish in water at high temperatures, for example, near 100° F.
3. The effect of very slow thawing of frozen fish in water of near-freezing temperatures.
4. The effect of holding the fish in water for long periods, even after thawing is complete.
5. The effect of icing the fish after thawing.
6. The effect of using sea water in place of fresh water for thawing the fish.

As the determination of the exact effect on the fish of most of these factors will be difficult, some time has been devoted to assisting the laboratory in the development of taste-panel testing methods. It is not possible to detect some of these effects without more refined testing procedures.

C. The classification "Shore Processing Studies" covers a variety of investigations, some more or less overlapping into the first two classifications. None of the six studies listed in this group has been pursued far enough to warrant a full-scale final report. The results of the first experiments on commercial processing of fish which had been frozen in brine at sea were reported in "Freezing Fish at Sea--New England: Part 4 - Commercial Processing of Brine-Frozen Fish" (Commercial Fisheries Review, vol. 14, no. 2, February 1952, pp. 26-29). After over 10 months of storage, the fillets prepared from the brine-frozen haddock compare favorably with fillets from iced haddock from the same trip.

1. The study of methods of unloading and storing fish frozen at sea has been limited to the use of available handling equipment. Improvements have been made each time the Delaware has been unloaded. However, the law of diminishing returns is evident. It is unlikely that any further marked improvement in unloading rate or conditions is possible until brine-frozen fish are delivered in larger quantities. The loads delivered by a single vessel are not large enough to warrant the installation of expensive new handling equipment by cold-storage companies or by anyone else. The latest system followed in unloading the Delaware employed a vessel crew of 8 men--4 in the hold, 2 on deck, and 2 on the dock. A sustained unloading rate of about 25,000 to 30,000 pounds per half day is the most that can be expected. This is about 50 to 60 percent of the rate normal to unloading of iced fish. The handling of the frozen fish by the cold-storage crew is still highly inefficient, but as this operation is not under our control, it is not a simple matter to experiment. No unusual ideas have been developed on the storage of the fish. The cold-storage operators consider the handling of the fish in very large boxes more or less impractical. Therefore, the frozen fish are simply stacked in piles.

2. The handling, scaling, and filleting of the thawed round haddock has so far offered no special problem. Therefore, after making further observations



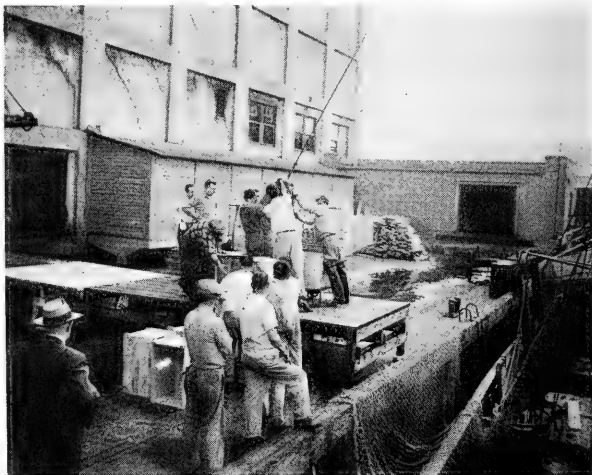
REMOVING FROZEN FISH FROM DELAWARE'S COLD-STORAGE HOLD.

on these operations, the information will be included in reports on another subject. So far, in all commercial trials in standard commercial processing plants, the thawed fish have been reported to handle, scale, and fillet at least as easily as iced, gutted fish. The presence of the viscera appears to simplify scaling with mechanical hand scalers. Also, with round fish it should be practical to scale the fish well with a rotating drum scaler. The filleters noted that there was less slime on the fish; this is an advantage to some and a disadvantage to others, apparently depending on their filleting styles. The filleters were all pleased with the "fresh," firm feel of the meat.

3. The first study of the effect of prolonged storage of round brine-frozen fish was begun in May 1952. The best controlled series were begun in August and

September 1952. No conclusions can yet be drawn on any of these experiments. Brine-frozen haddock held for up to 3½ months by private concerns have looked as though moderate drying had occurred during the storage period. However, after the fish were thawed, they were found to look good and to handle well. The fillets prepared from this haddock in storage a few months compared well with fillets prepared from iced haddock currently being delivered.

4. The data thus far accumulated on yields of fillets have been highly encouraging--35 to 44



UNLOADING FROZEN FISH FROM THE DELAWARE INTO BOXES ON TEMPORARY LOADING PLATFORM.

percent on the basis of skin-on fillets from round fish. The variation is partly due to differences in the condition of the fish (which vary somewhat according to the season). Another reason for variation is the disparity in the skills of different filleters. In order to compare fillet yields from round fish with fillet yields from iced, gutted fish, the weight of the viscera must be known. Only twice has it been possible to secure this data. In each case, on scrod haddock caught in October, the viscera recovered amounted to 10 percent of the total round weight. The contents of viscera appears to be higher in spring and summer-caught fish. Arrangements are being made to secure more complete data as often as possible.

5. In most thawing trials, the weights before and after thawing have been noted. When the fish had been in storage for less than a week and the storage temperatures and conditions had been "good," there was no significant change in weight. Brine-frozen round scrod haddock stored for one to two weeks gained approximately one percent during water-thawing at 60° F. These data must bechecked in additional trials, especially after several months of storage.

6. The preparation of steaks directly from frozen round fish has been tried in an incidental way. A thorough study of this possibility is contemplated. It is also planned to investigate the possibility of preparing wrapped dressed fish or chunks.

LABORATORY: The work in the testing laboratory has been confined largely to the application of various methods that might be of value in determining and comparing the quality of frozen haddock fillets that have been prepared from brine-frozen and thawed fish in the round, and from iced, gutted fish. Test procedures have involved the use of organoleptic examinations as well as physical and chemical methods such as press drip, free drip, dry-matter content of press drip, texture, salt content, and trimethylamine content of the fillets. A somewhat detailed description of the testing procedures has been reported previously ("Freezing Fish at Sea--New England: Part 2 - Experimental Procedures and Equipment," Commercial Fisheries Review, vol. 14, no. 2, February 1952, pp. 8-15). The results of some of the preliminary laboratory tests, obtained prior to actual semi-commercial production of fillets from brine-frozen fish, have also been reported ("Technical Note No. 22--Fish Frozen in Brine at Sea: Preliminary Laboratory and Taste-Panel Tests," Commercial Fisheries Review, vol. 14, no. 7, July 1952, pp. 20-23).

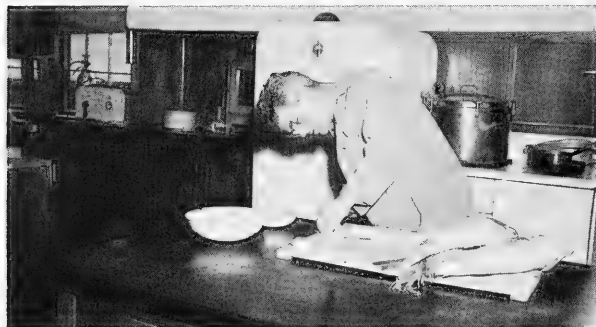
In addition to various routine tests that, in the aggregate, consume an appreciable amount of time but which nevertheless are necessary in the over-all conduct of the project, considerable time has been spent in examining the possibilities of using freezing media containing certain organic compounds and salts, other than sodium chloride, for freezing fish. Some work has been done on the histology of haddock flesh in relation to changes in cellular structure that might occur as a result of freezing once, and of thawing and refreezing. Effect of freezing on the formation of trimethylamine in fish after thawing has been given some attention. These side projects will be discussed in more detail later in this report.

Quality Evaluation of Stored Samples: Some long-range studies on quality evaluation of haddock fillets prepared from brine-frozen fish and iced fish, and held in commercial storage at -10° to 0° F. have now been under way for over 10 months. Three lots of fillets are being examined, namely those prepared from: (1) iced, gutted fish; (2) fish frozen in the round in brine, followed by thawing in water at 53° F. for 3-3/4 hours; and (3) fish frozen in the round in brine, followed by thawing in water at 72° F. for 1-3/4 hours. Examinations of the fillets have been made at intervals of 3 to 4 weeks over this storage period. Palatability tests have been made by a panel of laboratory personnel, with test samples

prepared mostly by steaming. Other tests have been made on the uncooked fillets. A random selection of three 5-pound cartons of fillets from each lot are used as the source of samples for each test in order to obtain reasonably representative results.

The results to date have indicated some changes in the quality of the three lots over the period during which they have been in storage. The changes, however, have been practically the same for each lot--a slight decrease in palatability scores, a rather definite increase in press drip, and an increase in tenderness readings (indicating decreased tenderness). Very little over-all change has occurred in free drip, total solids in press drip, and trimethylamine content for the three lots. At this time, the fillets are considered to be of nearly equal quality in all three lots and show no adverse effects due to refreezing.

Freezing Media Studies: During the past year, compounds to be used as substitutes for or additives to sodium-chloride brines, to enable freezing operations



PREPARING BRINE-FROZEN FISH FOR SALT ANALYSIS.

to be carried out at a lower temperature, have been tested. A large number of compounds were investigated. For reasons of toxicity, viscosity, hydrolysis effects, etc., the number of possibilities was reduced to a relative few. These compounds are both inorganic, such as various salts, and organic, such as carbohydrates, alcohol, and glycerol. They may be used alone or in combination with sodium chloride.

In addition to possible toxic properties of the additives, factors which determine the cost of the brine must be considered. To be efficient as a freezing medium, a brine must afford maximum depression of the freezing-point for minimum quantities of solid substance added. Such a requirement implies that the freezing curve for the resulting medium should exhibit little or no horizontal portion or "plateau effect" with increasing concentration. Ionization or splitting of a dissolved substance into two or more charged particles, tends to increase the effectiveness of the substance. Ionization is a characteristic of inorganic, but does not occur in organic compounds (other than salts of organic acids), so that the freezing point is reduced more, per molecular weight, by inorganic than by organic additives.

The "plateau effect" is most characteristic of carbohydrate syrups and is noticeably present in other organic media. Highly concentrated solutions are required for effective reduction of freezing points. For example, various sugar syrups require concentrations in water in the range of 50 to 60 percent (by weight) to permit low freezing temperatures to be attained.

Inorganic brines, to be commercially practical, appear to be limited to sodium chloride, magnesium chloride, or calcium chloride. The last, due to its deteriorative effect upon the meat of fish, would require some modification. These brines are characterized by efficient and relatively great reduction in freezing points, as shown in the table on page 37.

The feasibility of using calcium chloride or magnesium chloride is still being investigated. Of the two, magnesium chloride appears the most promising. Fish frozen in a eutectic (22 percent by weight) magnesium-chloride brine at temperatures of -10°F. and -20°F. are indistinguishable visually from the normal iced product. The few organoleptic tests performed thus far have evidenced no taste differences from control samples frozen in sodium-chloride brine. A sample of approximately 5,000 pounds of haddock frozen in magnesium-chloride solution is to be placed in commercial cold storage (-10°F. to 0°F.). This sample will be regularly tested chemically and organoleptically during a period of approximately one year in storage for changes in flavor, appearance, and texture.

Compound	Percentage present in water solution	Eutectic freezing temperature of solution
Sodium chloride	23.3	-6°F.
Calcium chloride (75 percent)	38.0	-36°F.
Magnesium chloride	22.0	-27°F.

The solubilities of other chlorides, when added to eutectic sodium-chloride brines, are greatly reduced, and any further depression in freezing point caused by the addition of the other chlorides is negligible. It is possible, however, to bring about a more substantial decrease in freezing point by decreasing the concentration of sodium chloride and thereby permitting increased quantities of the more efficient magnesium chloride to be added. Mixtures of this type are under investigation. Fish frozen in a mixture (15 percent by weight each of sodium and magnesium chlorides) at -10°F. have been tested organoleptically and chemically. No differences in flavor, texture, or appearance could be noted. Chemically, the penetration of salt into the meat of the fish as indicated by an increase in the chloride concentration when using the mixture was markedly reduced as compared to that for fish frozen in sodium-chloride brine. Storage of large quantities of fish frozen in these mixtures is not at present contemplated. It is felt that the results to be obtained from storage tests of fish frozen in magnesium-chloride brines will indicate whether magnesium chloride, as a substitute for or an additive to sodium-chloride brine, is usable.

Organic compounds, due to the "plateau effects" found in the freezing curves, due to their lack of ionization, and also because of relatively high costs, have not been extensively studied in this project. Much higher concentrations of organic compounds in water are required to attain a given reduction in freezing point than is the case with the more efficient inorganic salts. For example, while a 20-percent solution of sodium chloride will reach a temperature of approximately 0°F. before freezing, a 64-percent solution of sucrose is required to reach the same temperature. Not only is cost a factor in this case, but a solution of a much higher viscosity results, which retards heat transfer.

It is possible to add alcohol or glycerine to eutectic sodium-chloride brines without having the sodium chloride precipitate. Here again, however, the "plateau effect" of the freezing curve is observed. While reasonably low temperature-freezing solutions may be obtained from these mixtures, the temperatures reached are not sufficiently low, as compared to some other substances, to justify the additional cost unless found to be the only usable methods.

The addition of glucose to inorganic-salt brines has given promise of usable brines. A mixture of 12.5-percent sodium chloride and 34-percent glucose in water freezes at -10°F. Calcium chloride (25 percent) when mixed with glucose (25 percent) in water will freeze at -25°F. This solution does not cause the usual deteriorative effect upon the meat of fish found in solutions in which calcium chloride is the single dissolved component. No eutectic points have yet been found in

these calcium chloride-glucose solutions. The degree to which the temperature may be lowered is limited only by viscosity effects.

In summary, the following general statements may be made regarding immersion freezing media. The costs of sodium-chloride brine substitutes cannot possibly compete with the costs of sodium chloride. It is probable, however, that such low-temperature brines will be usable for longer periods since, for several reasons, contamination of the brine will be reduced. The possibility of the brine freezing in the heat-exchanger tubes will be minimized since the freezing point of the brine approaches the minimum temperature of the vaporizing ammonia surrounding the tubes. Lower brine temperatures will lower the degree of penetration of fish by the brine. Freezing-rates at -10° F. are approximately twice those at $+10^{\circ}$ F. Immersion periods will be proportionately shortened. Since penetration occurs, to a limited extent, even after freezing of the surface has taken place, the shortened immersion period will operate to reduce penetration of the brine into the fish.

Trimethylamine in Frozen and Thawed Fish: In developing the technique for determining the content of trimethylamine nitrogen in haddock, some results were obtained which indicated that fillets which had been previously frozen and then thawed produced trimethylamine at a much lower rate than did previously unfrozen fillets (both samples were held at above-freezing temperatures). Since the trimethylamine test is being used in this project in making quality-evaluation comparisons, it was thought advisable to conduct a side project of short duration to go further into these findings. Some samples of fresh haddock fillets and gutted haddock were held in crushed ice and removed at intervals as freshness decreased for plate-freezing and storage at 0° F. Other samples were plate-frozen immediately, without any holding period in crushed ice, and stored at 0° F., while a third series was brine-frozen and placed in 0° F. storage. After freezing and at different intervals of frozen storage, samples were placed in a household refrigerator at a temperature of about 40° F. for holding until spoilage of the samples occurred, as judged organoleptically. Trimethylamine-nitrogen determinations were made initially and at appropriate intervals during the test.

The samples held in crushed ice showed a progressive increase in trimethylamine nitrogen during the holding period, reaching a value of about 27 mg. per 100 gm. of the meat of the fish for the last of the fish that were removed from the ice to be frozen. Immediately after freezing, the values dropped to about 10 mg. Upon removal of the samples after various periods of storage up to three weeks at 0° F. and placing in the household refrigerator, no appreciable rise in trimethylamine nitrogen occurred even though the fish became badly spoiled. Similar results were obtained during spoilage of the samples that had been frozen immediately and then placed in the household refrigerator. The results indicate that trimethylamine nitrogen values used as an index of spoilage for unfrozen haddock do not appear to be valid when the fish have been previously frozen, then thawed and allowed to spoil at above freezing temperature. Under these conditions values did not rise much above 10 mg. per 100 gm. of the meat of the fish even when the fish had reached an advanced spoiled stage. A detailed report of this side project is being prepared.

Histology: Another side project which has been under way for some time is the preparation and study of sections of the meat from fish frozen once and twice. These histological studies were to be made originally to supplement the findings of other tests in evaluating the quality of the fish prepared and stored in the course of this project. At first we thought that as a result of refreezing some quality differences would occur, but none showed up. Therefore, the histological studies will be terminated shortly. Considerable difficulty has been encountered

in preparing satisfactory sections and the results obtained thus far have not been sufficiently encouraging to warrant further action at this time.

Actomyosin: Some preliminary results, at least insofar as developing the technique is concerned, have been obtained on the determination of extractable actomyosin in fish muscle. It is thought that by following changes in solubility of this substance, an indication of the degree of denaturation of the fish protein due to freezing may be obtained and these indices may, in turn, be of some value in showing possible effects of refreezing on protein breakdown. Because of the press of other work and the delay in delivery of essential laboratory equipment, very little progress has been made in conducting accurate determinations of actomyosin until quite recently. These determinations are now under way and should progress more smoothly than in the past.

Consumer Acceptance Tests: To supplement the findings in the quality-evaluation tests made in the laboratory and, more particularly, to obtain the reactions and opinions of consumers regarding the quality of fillets prepared from brine-frozen fish and from iced fish, large-scale consumer acceptance tests have been planned. Approximately 200 letters were sent out through the Massachusetts Division of Marine Fisheries, explaining the purpose of the tests and asking whether the recipients would be interested in cooperating in such tests. Although the response was less than anticipated, a sufficient number expressed a desire to participate in these tests. A number of the potential participants were visited and arrangements made to start the tests. The tests will be made in the participants' homes on samples delivered by us; the samples to be prepared for the table by the participants in any desired manner. Generally, fillets from brine-frozen fish and fillets from iced fish will be tested and compared simultaneously. A simple questionnaire signifying the preference, if any, will then be filled out and mailed to the laboratory. Plans are being discussed to expand the consumer tests to neighbors of the laboratory personnel, and to organized groups that might serve to give a representative cross-section of the consumer public.

Future Laboratory Studies: Among some problems planned for future study are organoleptic tests for seasonal effect on quality of fish frozen at sea, and of commercially-iced fish. While this, in effect, has been and is being done in connection with the various cruises made by the Delaware, the scope will of necessity be limited due to the laying-up of the boat at certain times during the year.

Another problem is to investigate procedures to reduce drip in fillets when they are thawed. It is planned, at first, to determine the effect of dipping the fillets in sodium-chloride brines of various strengths, holding the time constant. Variations of this procedure may then be tried.

Although some data have been collected on relative tenderness of the meat of brine-frozen and air-frozen fish, it is planned to supplement these findings with further data of this type.

Considerably more work should be done in developing recommended procedures for reducing brine penetration into the fish during the brine-freezing process. Factors such as temperatures of the brine, length of time the fish are held in the brine both prior to and after freezing, and possible effect of freezing before rigor and during rigor are to be considered.

Further work may possibly be done on developing freezing media that permit lower temperatures to be used in immersion freezing of the fish.

(Boston)





TRENDS AND DEVELOPMENTS

Additions to the Fleet of U. S. Fishing Vessels

A total of 41 vessels of 5 net tons and over received their first documents as fishing craft during August 1952--11 less than in August 1951. Californialed with 6 vessels, followed by Louisiana with 5 vessels, and Alaska and Texas with 4 vessels each, the Bureau of Customs of the Treasury Department announced.

Vessels Obtaining Their First Documents as Fishing Craft, August 1952					
Section	August		Eight mos. ending with August		Total
	1952	1951	1952	1951	
	Number	Number	Number	Number	Number
New England	3	1	23	26	36
Middle Atlantic	1	1	22	28	34
Chesapeake	3	-	43	19	36
South Atlantic	6	8	57	76	118
Gulf	15	15	88	129	173
Pacific Coast	9	21	187	247	284
Great Lakes	-	2	77	11	25
Alaska	4	3	80	60	71
Hawaii	-	1	-	3	3
Total	41	52	507	599	780

NOTE: VESSELS HAVE BEEN ASSIGNED TO THE VARIOUS SECTIONS ON THE BASIS OF THEIR HOME PORT.



Atlantic States Marine Fisheries Commission Holds Annual Meeting

The 11th Annual Meeting of the Atlantic States Marine Fisheries Commission concluded a three-day session at Boston on September 5. Ninety-four Commissioners, Federal and state fishery administrators, scientists, and staff members attended the general session on September 4. The U. S. Fish and Wildlife Service reported on research undertaken in a variety of fields for the Commission.

The Commission discussed ways of defining "inland" marine waters to facilitate the regulation of out-of-state boats and the need for better state catch statistics to aid both research and administration.

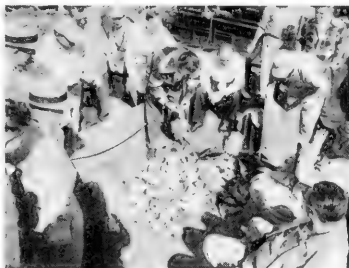
The Commission adopted the recommendations of its striped bass committee for the establishment of a cooperative Federal-state research program relating to striped bass and immediate opposition to the Clemente Bill, H. R. 8067, which would transfer the regulation of striped bass to the Federal Government, and would make it a Federal offense to catch striped bass anywhere in the marine waters of the U. S. except by hook and line. The Committee found and the Commission agreed that there was no evidence of over-all striped bass depletion, that the states were able and ready to enact any measures needed, that the Clemente Bill is contrary to precedent and without justification, and that its penalties are preposterous.

After the general sessions on September 4, the Chesapeake Bay and South Atlantic Sections met, and September 5 was devoted to meetings of the North and Middle Atlantic Sections of the Commission.

The four Sections reported to the September 5 afternoon closing session at which the Commission approved three recommendations from the North Atlantic Section, to request continuation by the U. S. Fish and Wildlife Service of the clam study and of the yellowtail study, and to urge the reconstruction of the obsolete Fish and Wildlife Service Laboratory at Woods Hole, Mass.

The various Section meetings received detailed reports on many special problems relating to their particular areas.

On September 6 members of the Commission and visiting scientists participated in demonstrations staged by the U. S. Fish and Wildlife Service of freezing fish in the round at sea on board the motor trawler Delaware and of Japanese long-line fishing methods for catching tuna on the Marjorie Parker, both of which sailed from the Service's East Boston docks for a full day's cruise.



BRINE-FROZEN FISH BEING INSPECTED ABOARD THE RESEARCH TRAWLER DELAWARE BY MEMBERS OF THE ATLANTIC STATES MARINE FISHERIES COMMISSION AND VISITING SCIENTISTS. THE ONE-DAY CRUISE WAS TO DEMONSTRATE THE FISH AND WILDLIFE SERVICE'S EXPERIMENTS ON FREEZING FISH IN THE ROUND AT SEA.



Federal Purchases of Fishery Products

FRESH AND FROZEN FISH PURCHASES BY DEPARTMENT OF THE ARMY, AUGUST 1952: For the military feeding of the U. S. Army, Navy, Marine Corps, and Air Force, the Army Quartermaster Corps this August purchased 3,999,589 pounds (valued at \$1,676,942) of fresh and frozen fishery products (see table). This was an increase of 75.4 percent in quantity and 52.8 percent in value as compared with the previous month, and 33.5 percent in quantity and 50.2 percent in value over August 1951.

Purchases of Fresh and Frozen Fishery Products by Department of the Army (August and the First Eight Months, 1952 and 1951)							
Q U A N T I T Y				V A L U E			
August		January-August		August		January-August	
1952	1951	1952	1951	1952	1951	1952	1951
Lbs.	Lbs.	Lbs.	Lbs.	\$	\$	\$	\$
3,999,589	2,996,287	22,504,070	20,270,207	1,676,942	1,116,243	10,245,608	8,335,084

January-August purchases this year rose 11.0 percent in quantity and 22.9 percent in value, compared with the corresponding period in 1951. The average cost per pound was 45.5 cents for the first eight months this year as compared with 41.1 cents for the same period a year earlier.

In addition to the purchases of fresh and frozen fishery products indicated above, the Armed Forces generally make some local purchases which are not included in the above figures. Therefore, actual purchases are somewhat higher than indicat-

ed, but it is not possible to obtain data on the local purchases made by military installations throughout the country.

* * * * *

NO CANNED SALMON FROM 1952 PACK REQUIRED BY ARMED FORCES: "Due to conditions prevailing in the Far East Command and because stocks on hand are sufficient to meet the needs of the Armed Forces during the next 12 months, the Army Quartermaster Corps does not plan to purchase any canned salmon from the 1952 pack," states a September 8 Department of Defense news release.

The announcement was made to inform industry of the Armed Forces' position in reference to its needs for canned salmon so that industry may plan accordingly. For the past several months, according to the release, troops in Korea have been supplied mostly with fresh foods. This reduced the requirement for canned foods—one of the chief components of operation rations which are served when fresh foods are not available.

Although the Department announced that canned salmon is occasionally served with the fresh-food rations supplied to troops both overseas and in the Continental United States, it is expected that requirements through calendar year 1953 can be met from stocks on hand.



Fishery Marketing Specialist Examination Announced

FISHERY MARKETING SPECIALIST EXAMINATION ANNOUNCED: An examination for Fishery Marketing Specialist (GS-5, \$3,410 a year) was announced by the U. S. Civil Service Commission on September 16, 1952 (Announcement No. 336). The registrates established from this examination will be used to fill positions in the Fish and Wildlife Service of the Department of the Interior in Washington, D.C., and throughout the United States. However, this same examination may be used to fill positions in other Federal agencies in Washington, D. C., and vicinity. The closing date for this examination is November 18, 1952.

Except for the substitution of education for experience as provided, applicants must have had 3 years of responsible experience in any position involving (a) the collection and compilation of market information and statistics on fishery products and the preparation from such data of analytical articles or bulletins for publication; or (b) marketing research requiring an intimate knowledge of commercial methods and practices in producing, processing, transporting, or marketing of fishery products. Study successfully completed at an accredited college or university with specialization in fisheries may be substituted for experience at the rate of one (1) academic year of education for 9 months of experience, up to a maximum of 3 years of the required experience; study successfully completed at a college or university with specialization in economics or marketing may be substituted for experience at the rate of one academic year of education for 6 months of experience, up to a maximum of 2 years of the required experience.

All competitors will be required to take a written test consisting of questions on paragraph reading, meaning of words, English usage, graph and table interpretation, and arithmetic reasoning. Examinations will be held at the places listed on the examination announcement.

Announcement No. 336 (dated September 16, 1952) which gives full details and information, and application blanks are obtainable from the U. S. Civil Service Commission, Washington 25, D. C., from any of the Commission's regional offices, or from any first- or second-class post office.



New England Tuna Explorations

"MARJORIE PARKER" ENCOUNTERS BEST TUNA FISHING OFF MASSACHUSETTS ON FISHING CRUISE NO. 6: A catch of approximately 2,000 pounds of bluefin tuna was made by the schooner Marjorie Parker on the sixth cruise of this year's New England bluefin tuna exploration. This vessel, which has been chartered by the U. S. Fish and Wildlife Service, for this cruise left Portland, Maine, on August 14 and returned to the same port on August 29. Adverse weather and a breakdown of the Japanese line hauler resulted in the loss of six fishing days during the cruise.

A total of 28 long-line sets was made during the trip and resulted in a catch of 56 tuna, averaging 35 pounds (round weight) each. Three tuna were caught with surface trolling lines, and two were captured on hand lines. Catches of blue sharks greatly outnumbered the tuna catch. Considerable time was lost in repairing the damage to the main and branch lines caused by the sharks.

Operations were conducted in four general areas: west southwest of Mt. Desert Light, Maine; east southeast of Cape Ann, Massachusetts; southeast of Cape Cod Light, Massachusetts; and southeast of Pollock Rip Lightship. The best results were obtained in the latter area where a set of 10 baskets (70 hooks) produced 13 tuna on the afternoon of August 25. Schools of tuna were sighted on four separate occasions in the waters southeast of Cape Cod Light, and another school was observed on Stellwagen Bank, about 10 miles northeast of Race Point on August 27. One small school of tuna was chummed alongside the vessel, using alewives for bait, but only two fish were taken with hand lines.

Landings were made at Gloucester and Provincetown, Massachusetts, and the catch was sold to commercial fish companies for \$240 and \$220 per ton.

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POOR FISHING PLAGUES "MARJORIE PARKER" ON FISHING CRUISE NO. 7: On Fishing Cruise No. 7 the schooner Marjorie Parker encountered and caught only a few tuna. Long lines and trammel nets were used. The vessel left Portland, Maine, on September 3 and completed the trip at Boston on September 23. Some fishing time was lost due to unfavorable weather. Fishing was conducted in five general areas: southeast of Portland Lightship, Maine; Boon Island, Maine; southeast of Cape Ann, Massachusetts; southeast of Cape Cod Light, Massachusetts; and southeast of No Mans Land, Massachusetts. Results were poor in all areas fished.

A total of 198 baskets of long-line gear was set, which resulted in a catch of approximately 850 pounds of bluefin tuna. A set of three trammel nets was unsuccessful. One bluefin tuna was captured with surface-trolling gear. Over 180 sharks (mostly blue sharks) were caught on the long-line gear.

Most sets produced sharks but no tuna. No surface schools were observed, although small scattered tuna were seen jumping south of No Mans Land. On Septem-

ber 21, a few unusually small tuna were taken on the long line about 50 miles south of Block Island. They ranged in size from about 7 to 12 pounds and were the smallest tuna yet taken in the Service's two years of tuna explorations in these waters.

The tuna catch was sold to commercial fish firms for \$240 per ton.

The vessel left Boston, Massachusetts on September 26 on Fishing Cruise No. 8 and was scheduled to return about October 4. Using long lines, gill nets, trammel nets, surface-troll lines, and hand lines, the vessel expected to fish on Cashes Ledge, Tobins (southeast of Cape Cod Light), and on the northern edge of Georges Bank.



North Pacific Exploratory Fishery Program

ALBACORE TUNA EXPLORATION BY "JOHN N. COBB" (CRUISE NO. 12): An eight-week albacore tuna exploration off the coasts of Washington, Oregon, and the northern part of California was conducted by the John N. Cobb in June and July. This exploratory fishing vessel is operated by the Service's Branch of Commercial Fisheries in the North Pacific.

To secure information concerning surface ocean currents in waters off Washington, Oregon, and northern California, a total of 5,000 drift cards were released on a course commencing 50 miles west of Cape Flattery, Washington, and terminating 500 miles west of Cape Blanco, Oregon, on June 19.

After release of the cards, trolling for tuna commenced and the first albacore of the trip was caught on June 24, approximately 525 miles west of Trinidad Head, California. Scattered tuna were taken in the same general area until June 28. Although trolling was carried on continuously, no more albacore were taken until July 11 and 12 when several were caught from 180 to 250 miles off the coast of southern Oregon. Small scattered schools were encountered between July 24 and July 28 between Cape Meares and Cape Falcon, Oregon, about 45 miles offshore, during which time the best single day's catch (89 fish) was made. Fishing results for the remainder of the cruise were poor, with only a few scattered fish being found.

Surface water temperatures from June 20 to July 1 varied from 56° F. to 58° F. in the area from Trinidad Head to Cape Blanco at distances from 235 to 600 miles offshore. A surface water temperature of 60° F. was encountered for the first time on the trip about 110 miles west of Heceta Head, Oregon, on July 2. The best fishing of the trip occurred in surface water temperatures of 59° F. to 60° F. about 45 miles offshore between Cape Meares and Cape Falcon from July 24 to July 28.

Experimental gill nets were fished twice, catching only 2 tuna. A total of 147 albacore were tagged with streamer-type tags. During most of the cruise the prevailing winds were north and northwest, frequently strong, with choppy to rough seas.



Pacific Coast States Conducting Experimental Bottom Fishing at Great Depths

The deepest experimental bottom fishing ever conducted on the Pacific Coast is now under way as a joint project of the three coastal states, according to an August 27 news release from the California Department of Fish and Game.

California, Oregon, and Washington fish and game agencies each assigned marine biologists to participate in the bottom-fish research cruise of the California Department of Fish and Game vessel, N. B. Scofield, which started August 12 and was expected to end September 12.

The tri-state cruise which began at Eureka and was scheduled to wind up at Cape Flattery or Tatoosh Island off the Washington coast, is the first made by the N. B. Scofield since installation of new deep-sea exploratory gear. New, remote-controlled winches will pay out 1,600 fathoms of cable, and allow mile-deep drags of heretofore unknown ocean bottoms.

The cruise objectives were to test fishing nets to determine the "escape sizes" for various deep-sea species.



Pacific Oceanic Fishery Investigations

RESEARCH VESSELS RETURN FROM FISHING AND HYDROGRAPHIC SURVEYS: "John R. Manning": The return on September 15 of the Service's Pacific Oceanic Fishery Investigations (POFI) vessel John R. Manning from an exploratory and experimental fishing cruise in equatorial waters has added further to the Service's knowledge of tuna resources and habits in that vast ocean region. The best fishing along the 150th meridian occurred, as usual, north of the equator, but the tuna yield was low. The vessel started on the cruise August 6.

The catching rate dropped to 5 tunas per hundred hooks as compared to over 10 tunas per hundred hooks for the last year's cruise of the Hugh M. Smith (another POFI vessel) to the same locality. Biological and hydrographic data which were collected simultaneously may, upon study, uncover reasons for the poor fishing which plagued the chartered vessel Cavaliere early in September when it attempted to catch a load of tuna in the same equatorial region.

A special experiment of 24 hours' fishing by setting and hauling long-line gear every 4 hours produced catches composed entirely of yellowfin tuna during the day and entirely of big-eyed tuna at night. Further similar experiments must be carried out to check this striking difference indicated by one full day's fishing.

"Cavaliere": After undergoing considerable repair, the Cavaliere departed Honolulu on August 13 for its second attempt to obtain a commercial load of tuna by means of long-line gear. August radio reports indicated that fishing was excellent. The catch rate in the "rich zone" was 9 to 12 tuna per hundred hooks with 70 baskets of gear set. This amounts to 2 or 2½ tons of tuna per day. However, early September reports stated that fishing felloff considerably.

"Hugh M. Smith": The vessel Hugh M. Smith returned to Honolulu on August 29, after completing a 38-day hydrographic cruise (No. 16) for the purpose of making special observations on surface and subsurface currents in the region of the equa-

tor and on the vertical distribution of zooplankton in respect to the thermocline. At the equator the water was moving strongly to the northwest at the surface and strong to the east at depths of about 200 to 300 feet. While a northerly component at the surface was expected on the basis of earlier indirect evidence, it was not expected to be as strongly toward the north as observed on this occasion. Drifts at several levels in the countercurrent confirmed the earlier indirect evidence on the lack of transverse circulation.

The Hugh M. Smith on September 15 returned to Honolulu from a 10-day hydrographic cruise (No. 17) in island waters. The trip was occasioned by recent poor skipjack catches by the local sampan fleet. Physical, chemical, and biological data obtained on this cruise will be compared to similar data collected during the exceptionally good skipjack season of last summer in the hope of revealing a casual change in the environment. Only 8 schools of tuna were sighted in the 10 days of observation; 7 of these were identified as skipjack tuna. Trollinglines only yielded 4 dolphin.



Proposals Invited for Lease of a Fish Cannery in Tutuila, American Samoa

The Government of American Samoa will entertain proposals for the lease of a fish cannery which it owns, together with the equipment and facilities, located at Tutuila, American Samoa. Bidders must be citizens or nationals of the United States, or if the bidder is a corporation or company, at least 75 percent of the stock of or interest therein must be held by citizens or nationals of the United States.

American Samoa is a territory of the United States and under existing laws its products may enter the United States duty free. It is located 2,276 miles south of Hawaii and, according to the results of recent studies by the Pacific Oceanic Fisheries Investigations of the United States Fish and Wildlife Service, is within less than a thousand miles from one of the richest sources of tuna in the Pacific.

The Tutuila cannery is a well-planned, modern installation consisting of 4 buildings with 2 roofed-over areas between the buildings. Each building is about 200 feet long and 50 feet wide. The buildings are designed to promote an orderly and efficient flow of materials from the fresh or frozen tuna receiving room to the canned tuna storage space. They contain the newer devices and material for hand packing tuna. The plant is also equipped with a steam-jacketed rotary drier in which waste products of a solid nature, such as heads, bones, viscera, and skin, may be processed into fish meal. Combustible gases from this drier are burned in the boiler fire boxes to minimize the odors discharged into the outside air. The plant is capable of handling 21 tons of tuna and of producing 1,000 cases of canned tuna each eight-hour day. The cold-storage area, with a Freon refrigeration system, is capable of freezing and/or storing approximately 240 tons of tuna. The cannery also contains several items of equipment under lease from the American Can Company at an aggregate annual rental of \$892.40. A lease of the cannery will not include this equipment. The successful bidder will probably have to make his own arrangements with the American Can Company if he wishes to use this equipment.

Dock facilities at the plant are adequate for use of the fishing vessels in unloading their catch and in outfitting for the next trip. Highway facilities from points around the bay to these docks are adequate for transport of supplies and materials by truck. The standard utilities of electric power, potable water, and telephone services are available. Although the water supply may not now be adequate for year-round operation of the cannery, the Government of American Samoa is presently taking steps to increase the local water-storage capacity.

The supply of local workers for the cannery crew is said to be satisfactory on the basis of the short trial runs made to date.

Transportation facilities are available for ocean shipments to and from the mainland of the United States and Tutuila via Matson Lines freighters and via Union Steamship Lines. Scheduled trips to Samoa are made monthly. Vessels stop at Tutuila en route to the mainland about seven times a year, i.e., whenever a minimum of 350 tons of cargo is available for shipment to the mainland.

No airplane service is in operation in American Samoa at the present time. The New Zealand National Airlines now make flights about once weekly between British Samoa and Fiji where airlines stop en route to and from Hawaii and New Zealand or Australia. There is a good possibility that an air link between American Samoa, Western Samoa, and Canton Island (which is a regular stop for airlines traveling between Hawaii and Fiji) will soon be established.

The chief concern of the Government of American Samoa is that the facilities of the fish cannery be operated successfully in order to improve the civilian economy of American Samoa by developing technical skills among the Samoans, and providing local income through wages and through ancillary enterprises. Accordingly, in evaluating the proposals submitted, primary consideration will be given to that part of the proposal which outlines a plan and contains detailed information upon which the Government can determine that the prospective lessee has the necessary financial resources, experience, and the qualifications that would ensure a continuance and successful operation of the cannery. Proposals submitted should contain an offer of the annual rental fee which the bidder would be willing to pay.

Each proposal must be accompanied by a certified or cashier's check in the sum of \$1,000 drawn to the order of the Treasurer of American Samoa. These checks will be returned to the unsuccessful bidders. The check of the successful bidder will be forfeited if he refuses or fails to execute the lease of the cannery but will be returned if he accepts an award and executes the lease. The Government of American Samoa reserves the right to reject any and all proposals.

The proposed lease will be for a period of three years and the lessee shall have an option to renew for an additional three-year term on the same terms and conditions as the original lease. The lessee will be required to provide all maintenance, repairs, and replacements, to carry insurance covering loss by fire and other loss included under extended coverage policies (but not including loss by act of God, hurricane, flood, war, or other cause beyond the lessee's control as may be specified in the lease). The lessee will be required to pay all valid taxes, assessments, license fees, or other levies imposed by the Government of American Samoa or by the Government of the United States.

Proposals must be submitted to the Governor of American Samoa at Tutuila, American Samoa, with a copy to the Director, Office of Territories, Department of the Interior, Washington 25, D. C., not later than January 15, 1953, and should state clearly and in detail:

1. Identity of the bidder, including citizenship and previous experience and that of any associates in the proposed venture.
2. Plans for operation of the cannery, including number of Samoans to be employed and number and nationality of non-Samoans to be employed.
3. Plans for obtaining sufficient fish to keep the cannery in operation.
4. Plans for transporting and marketing the product of the cannery.
5. Financial resources and ability to maintain a continuing and successful cannery operation.

Further inquiry regarding American Samoa and the leasing of the fish cannery in Tutuila should be directed to the Director, Office of Territories, Department of the Interior, Washington 25, D. C. The award of the lease to the successful bidder will be made by the Governor of American Samoa, after consultation with the Director, Office of Territories, Department of the Interior, no later than 60 days after the closing date for receipt of proposals.



Shrimp Explorations Continued off the Caribbean Coasts of Honduras and Nicaragua

Exploration of new shrimp grounds off the Caribbean coasts of Honduras and Nicaragua was continued by the M/V *Antillas*, an experimental shrimp trawler. Owned and operated by the Gibbs Corporations, this trawler was used for the exploration under a cooperative agreement with the U. S. Fish and Wildlife Service. The vessel left late in June and returned late in July from a second exploratory trip in search of commercial quantities of shrimp in international waters off Central America.

Grooved shrimp of mixed sizes from about 25 to 60 count per pound (heads off) were found to be widely distributed from Cabo Honduras, Honduras, to Wana Lagoon, Nicaragua, at distances of from 5 to 20 miles offshore. Some indications of white shrimp were found off Wana Lagoon as far as 8 miles offshore. These signs improved as the 3-mile limit was approached, but it appeared that there would be little chance to make commercial-scale catches of white shrimp at distances in excess of 4 miles offshore at this season.

Upon arrival at Belize, British Honduras, the Colonial Fishery Officer advised that the Colony was anxious to develop new industries and that concessions might well be made to outside interests provided some local employment was involved. The coastal mainland of British Honduras is relatively low and numerous lagoons and rivers discharge a substantial flow of fresh water to the sea. The color of the water to the landward of the barrier reef changes from light blue, through turbid blue, to turbid green, and is quite muddy near the flats of the rivers and lagoons. An extensive flat, about 80 miles in length, lies to the northward of Belize and several large rivers empty into the area. This flat is thought to be predominantly mud bottom, but many sections are too shallow for free navigation of medium-sized shrimp trawlers. A streak of mud bottom varying from about 2 to more than 10 miles in width extends for a distance of about 60 miles south of Belize. Below this mud streak coral heads are quite common and the area

is generally unsuited for shrimp trawling. Another area of relatively smooth bottom lies below the coral head area and somewhat south of the Snake Island group.

Upon departure from the Gulf of Honduras, the Antillas proceeded along the Coast of Honduras and the automatic depth recorder was kept in constant operation. The major portion of the course was over depths between 5 and 100 fathoms and the sounding pattern was very irregular, indicating unsuitable bottom for trawling, until Cabo Honduras was reached. From there to Wana Lagoon, south of Cape Gracias A Dios, as was the case during the trip in May, relatively smooth bottom was found between depths of 5 and 20 fathoms over a distance of about 200 miles. The coast of Honduras, Cabo Honduras to the vicinity of Cabo Camaron, is relatively mountainous with a few lagoons and rivers discharging into the sea. Southeastward from Cabo Camaron along the coast of Honduras and south along the coast of Nicaragua, the land is low and large rivers and lagoons are common. These geographical conditions, together with the presence of mud bottom and turbid water, should be conducive to populations of shrimp.

A total of 39 drags with a standard try net and 2 with a large shrimp trawl were made at distances from 4 to about 60 miles offshore, but chiefly between distances of 5 and 15 miles offshore. Shrimp were taken in small quantities in 25 of the drags, but none of the locations that were prospected offered sufficient returns in the try net to warrant setting a large trawl. Grooved shrimp, pink in color, were encountered between depths of 6 and 25 fathoms with the best catches being made at depths between 14 and 19 fathoms. During May no white shrimp were found at depths in excess of 4 fathoms, but during the latter part of July they were found in small quantities in depths between 6 and 8 fathoms. It is possible that white shrimp would have been found in greater quantity had drags been made within 4 miles of shore. Two try-net tows were made about 70 miles north-northeast of False Cape, Honduras, in depths of 28 and 30 fathoms on mud bottom in the hope of finding an offshore schooling ground for grooved shrimp, but no signs of shrimp were encountered. The try-net drags were made throughout a 24-hour day, but there seemed to be little difference in the catches during darkness or daylight.

The fishing results were much the same in July as they were in May in that grooved shrimp were found over a large area, but they appeared to be thinly scattered or else the schooling areas were missed during the exploratory work. There was some evidence that the white shrimp were moving farther offshore. However, the results of the two trips tend to indicate that the schooling of grooved shrimp, if such occurs, is a seasonal condition. Circumstances prevented any search to the southward of Wana Lagoon during the trip in July and it is regretted that the extensive area shown to have mud bottom to the south of Bluefield, Nicaragua, could not have been investigated. While the bottom as shown on the existing charts between Wana Lagoon and Bluefield is largely coral and sand, it is quite possible that mud patches can be found in the area, for several substantial rivers and lagoons discharge there. It is planned to explore these more southerly areas, in addition to a resurvey of the areas already covered, during September, October, or November.

A variable pitch propellor of British design was installed in the Antillas and has been under test for more than six months. During this time it has performed very well and has been quite valuable for exploratory work wherein a wide range of power has been required. During the past voyage the lubrication seals on the thrust bearing failed and caused a loss of the lubricant. Seals of different materials are now being tested. The reversible pitch propellor could be used to advantage in shrimp trawling and should be particularly valuable on oceanograph-

ic vessels where wide variations in power are required for certain phases of the work, particularly when towing plankton-collecting devices.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, JULY 1952, PP. 31-2.

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United States Fishery Products Marketing Prospects (October-December 1952 and Outlook for 1953)

Consumption: Civilian consumption of fishery products in the U. S. during the last quarter of 1952 probably will be slightly larger than a year earlier. Supplies, especially of frozen fish, are likely to be somewhat greater than last year, and retail prices may not average quite as high as in the last quarter of 1951.

Freezings and Cold-Storage Holdings: Commercial fishing and fish-freezing operations will decline seasonally as the year comes to a close. On September 1, stocks of frozen fishery products in the continental United States were substantially above those of a year earlier. Cold-storage holdings will continue to rise until November or December and probably will set a new record high for each of the remaining months.

Canned Fish: Canned fish supplies will be seasonally large during the last quarter of the year as the 1952 packs of salmon and Maine sardines move into distribution channels in large volume. This year's pack of canned salmon is approximately the same as last year's, and that of Maine sardines is larger than the unusually small output in 1951. The production of canned tuna may not exceed the corresponding 1951 total, but supplies both at the packer level and in distribution channels are substantial. Processors have recently reduced the price of the lower grades of canned light-meat tuna in an attempt to encourage increased sales of this product.

Outlook for 1953: Supplies of fishery products in 1953 are expected to be plentiful. Probably as much fresh and frozen fishery products will be available as this year and, with a decline in military procurement from the 1952 packs in prospect, the civilian market most likely will have about as much canned fish. Through mid-1953, when the current marketing period ends, the supply of canned salmon and Maine sardines will be larger and that of canned tuna about equal to a year earlier. The per-capita civilian consumption of all fishery products (fresh and processed combined) in 1953 is expected to be a little higher than this year, reflecting in part the continued expansion of the domestic market for frozen fish and shellfish. With meat and poultry products likely to be in slightly larger supply and prices slightly lower than in 1952, retail prices of fishery products for 1953 as a whole may be somewhat lower than in 1952.

The pattern of foreign trade of the United States in fishery products in 1953 is expected to follow that of this year. Imports, especially of frozen fillets, probably will be above the record level reached in 1952 and will continue to furnish an important part of our total supply of frozen fishery products. Exports from the United States are likely to continue close to this year's relatively low level. The export market for our fishery products probably will continue to be limited by restrictions which were established by some countries in order to con-

serve their relatively small dollar resources. In addition, our exportable supply of pilchards (California sardines)--a popular commodity abroad--may not be as large as in 1952.

This analysis appeared in a report prepared by the Bureau of Agricultural Economics, U. S. Department of Agriculture, in cooperation with the U. S. Fish and Wildlife Service, and published in the former agency's October-December 1952 issue of the National Food Situation.



Wholesale and Retail Prices

WHOLESALE PRICES, AUGUST 1952: From July to August there was a downward trend in the wholesale prices of fishery products. The wholesale over-all index for edible fish and shellfish (fresh, frozen, and canned) for August was 99.8

Table 1 - Wholesale Average Prices and Revised Indexes for Edible Fish and Shellfish, August 1952, with Comparative Data									
Group, Subgroup, and Item Specification	Point of Pricing	Unit	Average Prices		Indexes (1947-49 = 100)				
			Aug. 1952	July 1952	Aug. 1952	July 1952	June 1952	Aug. 1951	Aug. 1951
ALL FISH AND SHELLFISH (Fresh, Frozen, and Canned)			99.8	100.9	100.8	101.4			
Fresh and Frozen Fishery Products			100.2	101.1	101.1	101.6			
Drawn, Dressed, or Whole Finfish			101.8	101.6	101.6	101.6			
Haddock, large, offshore, drawn, fresh	Boston	lb.	.93	.11	99.5	103.4	102.5	104.6	
Halibut, Western, 20/50 lbs., dressed, fresh or frozen	New York City	"	.51	.35	96.0	100.3	102.3	99.1	
Salmon, king, lge. & med., dressed, fresh or frozen	"	"	.49	.49	108.5	110.2	120.9	118.6	
Whitefish, mostly Lake Superior, drawn (dressed), fresh	Chicago	"	.43	.35	106.6	86.7	96.7	116.5	
Whitefish, mostly Lake Erie pound or gill net, round, fresh	New York City	"	.49	.47	99.1	94.0	93.0	103.6	
Lake trout, domestic, mostly 10-lb. drawn (dressed), fresh	Chicago	"	.59	.58	119.9	117.8	107.8	108.6	
Yellow pike, mostly Michigan (Lakes Michigan & Huron), round, fresh	New York City	"	.53	.71	103.1	166.5	106.7	141.2	
Processed Fish (Fish and Shellfish)			103.0	101.1	100.7	100.2			
Filets			88.5	90.2	93.6	93.3			
Haddock, small, skins on, 5-lb. fillet	Boston	lb.	.28	.27	88.5	90.2	93.6	93.3	
Shrimp, lge. (26-30 count), headless, fresh or frozen	New York City	"	.56	.60	88.5	94.9	93.3	83.8	
Oysters, shucked, standards	Boston area	gal.	5.00	4.50	123.7	111.3	111.3	120.6	
Processed Frozen Fish and Shellfish			106.2	106.6	106.6	104.0	101.8		
Filets									
Flounder (yellowtail), skinless, 10-lb. package	Boston	lb.	.36	.36	124.4	124.4	129.7	147.2	
Haddock, small, 10-lb. cello-pack	"	"	.23	.24	83.7	87.4	89.3	87.4	
Ocean perch (rosefish), 10-lb. cello-pack	Gloucester	"	.23	.23	108.3	108.3	108.3	110.2	
Shrimp, lge. (26-30 count), 5-lb. package	Chicago	"	.65	.64	99.5	98.7	99.5	87.9	
Canned Fishery Products			95.3	95.8	95.4	95.3			
Salmon, pink, No. 1 tall (16 oz.), 48 cans per case	Seattle	case	19.95	19.95	104.4	104.4	109.6	109.6	
Tuna, light meat, solid pack, No. 8 (7 oz.), 48 cans per case	Los Angeles	"	14.50	14.50	90.5	90.5	89.6	79.6	
Sardines (pilchards), California, tomato pack, No. 1 oval (15 oz.), 48 cans per case	"	"	9.38	9.38	109.4	109.4	109.4	78.8	
Sardines, Maine, keyhole oil, No. 3 drawn (32 oz.), 100 cans per case	New York City	"	5.95	6.45	63.3	68.6	71.3	79.4	

1/ REPRESENT AVERAGE PRICES FOR ONE DAY (MONDAY OR TUESDAY, IF AVAILABLE) DURING WEEK BEGINNING AUG. 10. PRICES ARE NOT THE ACTUAL ONES USED TO COMPUTE THE INDEXES SINCE THE PRICES USED FOR THAT PURPOSE ARE CARRIED OUT TO TWO DECIMAL PLACES.

percent of the 1947-49 average (see table)--3.0 percent below the previous month and 1.6 percent lower than in August 1951, the Bureau of Labor Statistics of the Department of Labor reports.

Landings throughout the country were liberal in August and demand fell off due to hot weather. Basically due to lower prices for fresh haddock, halibut, and salmon, the drawn, dressed, or whole finfish subgroup index this August was 8.8 percent lower than the previous month and 7.1 percent below the same month last year. From July to August, prices dropped 15.8 percent for fresh offshore drawn haddock, 11.4 percent for fresh or frozen dressed halibut, and 1.5 percent for fresh or frozen dressed king salmon. All of these items were quoted considerably below the same period last year. In August most fresh-water fish prices rose, except for yellow pike prices at New York City which dropped substantially.

Fresh processed fish and shellfish prices from July to August rose 1.9 percent and were 2.8 percent above August 1951. Fresh haddock fillet prices in August rose 1.9 percent above July, but were 7.1 percent lower than in the same month in 1951. Because of greater production along the South Atlantic Coast, fresh headless shrimp prices dropped 6.7 percent from July to August, but were still 5.6 percent higher than in August a year ago.

Frozen processed fish and shellfish prices this August dropped 0.4 percent below July, but were 0.4 percent above August 1951. From July to August lower prices were quoted for most varieties of frozen fillets, but frozen shrimp was quoted 0.8 percent higher. Compared with August 1951, prices were lower for frozen flounder fillets by 15.5 percent, for haddock fillets by 4.2 percent, and for ocean perch fillets by 13.2 percent, but frozen shrimp prices were 13.2 percent higher.

Canned fishery products prices in August continued to drop due to a decline (7.7 percent) in Maine sardine prices. The month's index for this subgroup was 0.5 percent lower than in July, but 1.0 percent above August 1951. Compared with August last year, prices for canned salmon were 4.7 percent lower and for Maine sardines 20.3 percent lower, while prices were higher for canned tuna (13.7 percent) and for canned California sardines (38.8 percent).

RETAIL PRICES, AUGUST 1952: Retail prices of all foods purchased by moderate-income families continued to climb (0.3 percent) from July 15 to August 15 and were considerably higher (3.7 percent) than during the same period a year earlier. On the other hand, all finfish (fresh, frozen, and canned) prices during this same period continued to drop (0.7 percent), and compared with the same period in 1951 were 4.7 percent lower (see table). There has been a steady decline in all finfish prices since March this year.

Table 2 - Adjusted Retail Price Indexes for Foods and Finfish, August 15, 1952, with Comparative Data				
Item	Base	I N D E X E S		
		Aug. 15, 1952	July 15, 1952	Aug. 15, 1951
All foods	1935-39 = 100	235.5	234.5	227.0
All finfish (fresh, frozen and canned) ..	do.	339.8	342.1	356.4
Fresh and frozen finfish	1938-39 = 100	290.7	291.8	292.5
Canned salmon: pink .	do.	448.8	454.2	508.2

Fresh and frozen fish prices from July 15 to August 15 dropped 0.4 percent and were 0.6 percent lower than in mid-August 1951. Canned pink salmon prices, which have been steadily dropping since June 1951, went even lower and in mid-August this year were 1.2 percent below the previous month and 11.7 percent below mid-August 1951.

Table 3 - Average Retail Prices and Price Ranges of Individual Finfish Products, August 15, 1952				
Product	Unit	U N I T E D S T A T E S		
		Range of Prices Aug. 15, 1952	A v e r a g e P r i c e s	
			Aug. 15, 1952	July 15, 1952
Frozen Finfish Fillets:				
Ocean perch/	lb.	30-69	45.7	45.9
Haddock 2/	lb.	33-75	50.3	50.1
Canned Finfish:				
Salmon, pink	16-oz. can	39-79	55.5	56.2

1/ PRICED IN 46 CITIES OUT OF 56.
2/ PRICED IN 47 CITIES OUT OF 55.

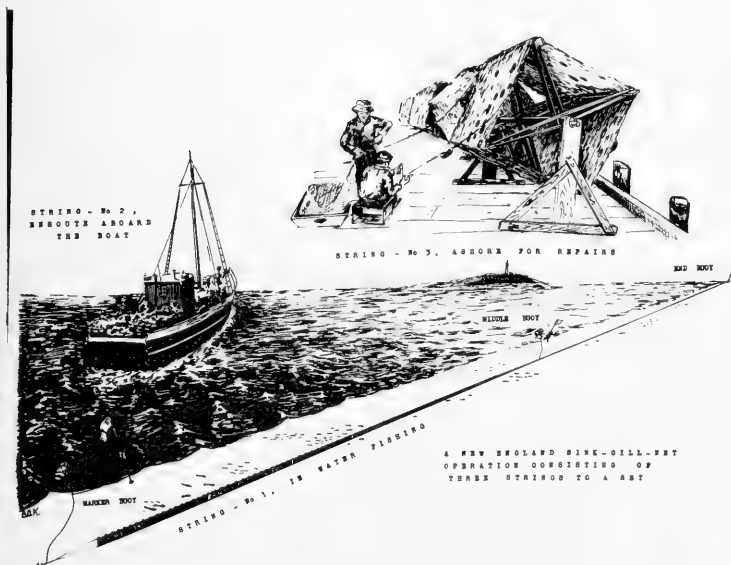
The average retail price for frozen ocean perch fillets in mid-August this year was 45.7 cents and for frozen haddock fillets, 50.3 cents per pound. A year earlier the average retail price for frozen ocean perch fillets was 46.1 cents and for frozen haddock fillets, 50.5 cents per pound. Canned pink salmon in mid-August this year retailed at an average of 55.5 cents per 16-oz. can, compared with 62.9 cents per can in mid-August 1951.



NEW ENGLAND SINK GILL NET

The gill net is a type of gear for catching fish which can be traced back to prehistoric times and yet still maintain a place of importance in world fisheries today.

The sink gill net is used in New England to catch groundfish (cod, haddock, and pollock). These fish are caught near the floor of the ocean on the New England fishing banks at a depth of 20-40 fathoms and up to 10-35 miles offshore.



ROTATION OF NETS IS SHOWN.

Gill-net operations are carried out during periods of fair weather. The season starts in early April and continues until late June. It is again resumed in September and generally lasts through December.

Gill-netting on the northeastern seacoast of New England had its inception back in the late 1870's. In the years 1908 and 1910 gill-netting formally got under way. At one time Gloucester operated over 54 gill-netters. Today only six remain in operation.



International

SOUTH PACIFIC FISHERIES CONFERENCE

A conference called by the Chilean Government to discuss conservation and preservation of natural resources in the South Pacific Ocean was held at Santiago, Chile, August 11-19. Chile, Ecuador, and Peru participated with official delegations, and an observer was present representing the Colombian Government.

Although no official reports have been issued as yet on the results of the conference, El Telegrafo of Guayaquil, Ecuador, published the following report:

CHILE, ECUADOR, AND PERU RESOLVE TO PROCLAIM SOVEREIGNTY OVER THEIR JURISDICTIONAL WATERS

They adopt various measures for the preservation of the riches they have and they will study means to increase them.

Sovereignty proclaimed over maritime lands in territorial waters and a fishing commission of permanent character will be created to watch over the riches of the sea.

A regulation will be drawn up for whale fishing based on the agreements of the Whaling Conference held in the U. S. A.

Santiago de Chile, August 19, (AP):

Chile, Ecuador, and Peru resolved to proclaim the sovereignty over their jurisdictional seas and adopted different measures for the conservation of the riches they contain as well as studies as to how they can be increased.

The said agreements were made in a closed session of the Conference on conservation and exploitation of the maritime riches of the South Pacific. Delegates from the three countries were present, and an observer from Colombia.

The agreements adopted must be ratified by the parliaments of the respective countries:

The conference approved:

1. The creation of a permanent fishing commission for the South Pacific which will be charged with watching over the maritime riches and completing a study on fishing in general.
2. The proclamation of sovereignty over maritime lands and submerged lands in territorial waters.
3. The creation of technical offices, with rotating chairmanship for whale fishing and fishing in general. These offices will gather industrial, scientific, and governmental data concerning the riches of the seas, and will submit a report at a time yet to be determined.

4. Regulation of species protected in open and closed areas, fishing seasons, etc.

5. Agreeing to draw up a regulation regarding whaling.

Juan Ruiz of Chile, who presided over the conference, declared that the resolutions adopted have as their object the protection of the flora and fauna of the seas of the respective countries, and systematic exploitation of these riches.

Ruiz said that the measures approved by the Conference were based on the agreements passed at the whaling conference held in Washington in 1946, but added that they eliminate the articles that prejudice the countries with a scarcity of ships, factories, and other resources to take full advantage of maritime exploitation.

Referring to the jurisdictional waters, Ruiz indicated that the proclamation of sovereignty is adapted to the new norms already accepted by the American republics and rejects the archaic concept of three miles from the coast which dates from the 17th century.

He added that the new precept was established by the President of the United States in 1945 and later by the governments of Mexico, Argentina, Peru, Chile, and others.

He added that the new doctrine was adopted by the Privy Council of Great Britain in 1950 with regard to the Falkland Islands.

Ruiz pointed out that the objective of the conference has been to avoid incursions of modern factoryships of foreign enterprises which "only hoist the flag of profit notwithstanding the good faith of their governments. The intervention of Ecuador and Peru has proved the brotherhood of our nation."

"These countries"—he added—"have not a nationalistic criteria, but have as a goal the right

of our countries to live and grow. We are disposed to accept maritime exploitation by those who have legitimate intentions."

The delegate from Ecuador, Charge d'Affaires Jorg Fernandez Salazar, speaking on behalf of the foreign delegations, acknowledged the hospitality of Chile and said that the conference signaled new norms of American cooperation.

INTER-AMERICAN TROPICAL TUNA COMMISSION

FOURTH SESSION HELD IN SAN JOSE: Members of the Inter-American Tropical Tuna Commission met in San Jose, Costa Rica, August 13, 1952, for the Fourth Session of the Inter-American Tropical Tuna Commission, an American Embassy dispatch dated August 14 from that city reports.

There were, in addition to the opening ceremonies, a morning session devoted primarily to administrative matters and an evening session devoted largely to a review of the scientific investigations of the tuna population in the eastern Pacific. No major problems presented themselves for discussion, and no new policy decisions were made. The Commission adjourned the same day.

FOOD AND AGRICULTURE ORGANIZATION

ADMISSION OF MONACO TO MEDITERRANEAN FISHERIES COUNCIL: Provisional arrangements for Monaco to attend the meetings of the Mediterranean Fisheries Council will be considered at the Sixteenth Session of the Council of FAO, which will convene on November 17, 1952. A formal decision on Monaco's application as a non-member of FAO to join the Mediterranean Fisheries Council will be rendered by the FAO Conference in November 1953. The Mediterranean Fisheries Council has already unanimously voted to accept Monaco's application.



Anglo-Egyptian Sudan

FISHERIES DEVELOPMENTS: The successful introduction of rainbow trout in the forest reserve in the Imatongs was reported in the July 28, 1952, issue of Sudan Press Agency, an American consular dispatch from Cairo states. In 1949, fingerling trout were supplied by the Kenya Game Department and put out in the upper Kinyeti River. Catches this year have proven that the trout have established themselves and are breeding. Future plans call for additional stocking of other streams by the Forestry Department utilizing trout caught from the Kenyoti River.

Concerning fishing developments in the Red Sea, analysis of samples of fish meal and shark oil have given promising results, and it is planned to conduct full-scale shark-fishing activities in the Mohammed Gul area. Shark liver oil is reported to bring about US\$360 per metric ton and fish meal about US\$130 per ton.

It is also proposed to declare a closed area on the Dongonab Bay-Mohammed Gul coast and that a Beja cooperative society will develop this area in the future. The Marine Fisheries Ordinance is to be enforced in the future and all foreign vessels which have been fishing these waters without permission using illegal-sized nets are to be stopped.



Brazil

FISHING BOATS ORDERED FROM DENMARK: A Danish shipyard has received an order to deliver 50 small fishing boats to Brazil by May 1953, according to Dansk Fiskeritidende (July 18, 1952), a Danish trade paper. The boats are to be 22 feet long with a pilothouse, engines, and electrical equipment.



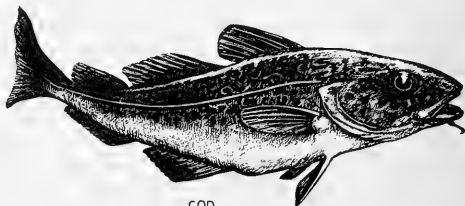
Canada

FISHERIES OUTLOOK FOR 1952: World economic conditions seem to be growing more stable and sudden changes are less to be expected than in the recent past.

Easing of inflationary pressure in North America, together with the growth of trade restrictions in the sterling area and other "soft" currency countries, is making 1952 less of a seller's year than 1951. On the other hand, maintenance of high levels of economic activity points to a continuation of generally prosperous conditions.

Against this generally favorable background, the various branches of the Canadian fishery industry will view their prospects in the light of the particular factors of demand and supply, competition, restrictions, etc., that are relevant to their markets.

The market for fresh and frozen fish and shellfish lies almost entirely in Canada and the United States. Here consumer spending at high, perhaps record, levels will provide a great opportunity for increased sales, but these will have to be made in the face of increased competition from other suppliers, more ample supplies of other foods, opposition to some fishery imports by certain groups in the United States, and a somewhat anomalous food marketing situation in Canada due to the embargo on cattle imports into the United States. These difficulties must, however, be seen against the fact that very large groups of the population in both Canada and the United States are potential, but not yet actual, consumers of fish and that the market for Canadian fresh and frozen fish and shellfish therefore can yet be substantially expanded.



COD

It is the canned fish trade which will feel most keenly the newly imposed import restrictions in overseas markets; and a considerable readjustment of its market pattern will be necessary. Here again the domestic and some important foreign markets are by no means saturated, but canned fish is in close competition with other foods and success will depend on the ability of the industry to meet competition in both price and promotion.

For salted dried groundfish, which constitutes the bulk of the cured types, the prospects are good. World supply is likely to be somewhat short and demand is strong. The dollar shortage is not expected to affect Canadian salt-fish exports to the British West Indies. While the special arrangement under which Newfoundland fish has been sold for sterling in certain Mediterranean markets has come to an end this year, Portugal, Spain, and Italy are believed to be in a position to make sufficient dollars available to allow the movement of normal quantities

into these areas. No significant change is foreseen in other cured fish markets, but the prospects for dried salted herring are still obscure because of the situation in the Far East.

In the byproducts market, meals will be strengthened by the high consumption of feeds in the United States; but the oil market may be kept depressed by heavy production of vegetable and animal fats without a corresponding increase in effective demand.

NOTE: THIS IS AN EXTRACT FROM THE PUBLICATION: CANADIAN FISHERY MARKETS (OUTLOOK FOR 1952: REVIEW OF 1951), MARKET BULLETIN NO. 6, ISSUED IN JULY 1952 BY THE CANADIAN DEPARTMENT OF FISHERIES, OTTAWA, CANADA.

* * * * *

FILLETING IS PREFERRED TO DRYING AND SALTING IN NEWFOUNDLAND: The uncertainty of drying and salting fish in Newfoundland, particularly in hot humid weather, consumes more of the fishermen's time than supplying fish for filleting plants. The latter allows fishermen more time for fishing or other occupations, states an August 28 American consular report from St. John's. A fairly strong market for fillets is reported, and the tendency toward a gradual but sure transformation in fishing methods continues, since more fish at less cost and work with greater financial returns to fishermen is bound to be the goal. On the other hand, only those Newfoundlanders who feel that their destinies are tied to the sea are going to stick to their nets in the face of more remunerative employment ashore, now that the industrialization of the island is relatively under way.

* * * * *

SHRIMP FOUND IN NEWFOUNDLAND WATERS: Shrimp have been found recently in Newfoundland waters, an August 28 American consular report from St. John's states. It is reported that shrimp have also been found near the northern edge of the Grand Banks, in the Gulf of St. Lawrence, and off the coast of Labrador.

It is rumored that certain United States and Canadian mainland interests are looking into the matter of shrimp fishing off the east and west coast of Newfoundland, where shrimp of marketable size were discovered about a year ago by a government exploratory vessel.

Shrimp sell in Montreal for C\$2.50 per pound and in St. John's, when available from the Mainland, for C\$0.75 per quarter pound. (Editors' note: It is believed that shrimp referred to are cooked and peeled and that quotations are at retail.)

The local press has recently declared that two United States fish-packing firms are now engaged in investigating the possibility of undertaking shrimp fishing in Labrador waters; so far, however, no information of value can be secured from either official or commercial sources. One daily paper claims that exploration has established that the bottom of Lake Melville (Labrador) in certain areas is literally encrusted with large jumbo shrimp. Inquiry directed to the Newfoundland Fisheries Research Station, St. John's, confirms the existence of shrimp in many Newfoundland waters; the size is generally large and often suited to commercial purposes, but the frequent presence of large boulders and other obstructions would be likely to make shrimp fishing difficult in a number of areas.

* * * * *

LONG-LINERS PROVE SUCCESSFUL IN NEWFOUNDLAND: Long-liner fishing is readily becoming more popular in Newfoundland, according to an August 28 American consular report from St. John's. Four long-liners, operating experimentally this year off the Northeast Coast under the direction of the Canadian Federal Department of Fisheries, met with good success. Commercial fishing by this method should prove profitable.

The use of the "Cape Island" type of fishing boat, with which the government has been experimenting for some time and which appears suitable for fishing in Bonavista, is reported generally unsuitable for Newfoundland needs. In Bonavista harbor, this type of craft rarely has to go out more than 30 miles from shore to make catches; in most other areas, however, trips up to 50 miles are often required and the "Cape Island" craft is not suited to deep-sea fishing under all conditions. This type of boat, from which much was expected, resembles a glorified harbor craft or cabin cruiser with an open well aft, and Newfoundland fishermen are reported to hold that, whereas the vessel may be seaworthy enough under normal conditions, they definitely want a full-decked job in which they can make long trips with reasonable safety.

In any event, government experimentation with this proposed type of craft has served a good purpose in that it has focused attention of the industry on efficient boat design, and through experimental operation at sea has shown the advantages of long-lining. The old style banker and "Labrador floater" had practically no superstructure; hence the problem of building craft superstructures never arose until now that additional designing is called for. The use of aluminum instead of wood in building deck houses is receiving attention and in the future may be put into general use in constructing both long-liners and seiners.

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NEWFOUNDLAND TO BUILD FISH-OIL HARDENING PLANT: The Newfoundland Provincial Government has announced final plans for the early erection of an oil-hardening plant at Harbour Grace—one of the last of the Government's industrialization projects. Work is expected to begin on the plant, within the next few weeks, reports an August 28 American consular dispatch from St. John's. An agreement between the Newfoundland Government and a German industrial firm was signed in London towards the latter part of August. A Canadian cement and machinery firm will construct the hardening plant under contract.

Some of the machinery for oil hardening has already arrived, and other equipment will reach St. John's by October, according to reports.

The German industrial firm is called upon by agreement to invest C\$1,200,000 in the establishment of the plant, this amount to be in the form of machinery, equipment, and structural steel from Europe. This equivalent will be matched by the Province in the form of a ten-year interest-bearing loan to be utilized in constructing the building and as working capital.

The plant will make use of marine oils (mainly whale, seal, and herring, with some caplin) which will be deodorized, bleached, homogenized, and hydrogenated to a lard-like ingredient for the manufacture of soap, margarine, cosmetics, etc. The plant will import vegetable oils for manufacturing purposes, principally peanut oil, cottonseed oil, and soybean oil.

About 120 men are expected to be on the payroll at first, with the possibility of more help later. The plant's use of oils from the various fisheries, say reports, "is expected to have a marked stabilizing effect on the Island's economy, particularly with regard to the seal fishery and the caplin and herring fisheries."



Ceylon

AIDS TO FISHERIES, 1951: Mothership towing has brought hitherto inaccessible grounds within the daily reach of Ceylon fishermen using indigenous craft, according to the July 1952 Current Affairs Bulletin, issued by the Indo-Pacific Fisheries Council Secretariat, FAO Regional Office, Bangkok, Thailand. Efforts have also been made to popularize the use of hand winches in shore-seining operations.

In the past year, the Government of Ceylon voted a sum of Rs. 3,000,000 (about US\$630,000) for assistance to fishermen's cooperatives.

With a view to relieving fisherman's distress due to seasonal unemployment during the monsoons, a Fishermen's Provident Fund is being created with the cooperation of the local leaders of the Catholic Church on the basis of a partial refund of the tithe collected in certain areas.



Colombia

PRESERVED OR CANNED FISH IMPORTS REGULATED: With the principal objective of stimulating Colombian exports (other than coffee), the Government on August 1 issued Decree 1830, which authorizes unrestricted exports of rice, sugar, corn, potatoes, salt, unmanufactured tobacco, tanned hides, beer, cigars and cigarettes, cement, textiles (cotton, wool or synthetic fibers), and gold manufactures. The exchange proceeds from these exports are convertible at 2.50 pesos per US\$1 (40 US cents per peso), in addition to which the exporters receive a negotiable "right" to import up to the same value certain items on the Prohibited List. Preserved or canned fish are among the items specified. As distinct from the other items specified, however, preserved or canned fish imports under Decree 1830 must come from the country purchasing the export products giving rise to the exchange, reports an August 14 American consular dispatch from Bogota.

The Government is authorized to extend these privileges to other export commodities as well as to suspend shipments of any items if the export price drops "notably" below the domestic price, or if shipments of these commodities threaten to create a domestic scarcity.

1/ FULL SPECIFICATIONS ARE: ITEM 120-A.-PRESERVED OR PREPARED FISH OTHER THAN SALTED, SMOKED OR DRIED, IMPORTED IN CANS, TERRINES OR HERMETICALLY SEALED CONTAINERS: 1. SARDINES. 2. OTHERS (INCLUDING SALMON). ITEM 120-B.-PRESERVED OR PREPARED FISH OTHER THAN SALTED, DRIED OR SMOKED, IMPORTED IN OTHER FORMS.

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SPECIAL IMPORT DUTY EXEMPTION FOR EQUIPMENT TO ESTABLISH FISHING INDUSTRIES: A special exemption for one year from customs duties for imports of machinery, laboratory, and other equipment for the first three companies to establish fishing industries in Colombia was renewed by a decree of July 1. The original legislation on which this exemption is based was approved in 1938, but up to the present time only one company has availed itself of the exemption.

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FISH CANNERY ESTABLISHED: A canning factory was officially opened at Santa Marta, July 29. The first products to be canned will be sardines, shrimp, mullets, and tuna. Later it is planned to include salmon, oysters, and other fish, with a possible production of fruits and fruit juices. Starting production is estimated at 720 cans per hour (size not indicated).

Ecuador

TERRITORIAL WATERS SOVEREIGNTY REAFFIRMED: The Ecuadoran Congress in a joint session on August 20 passed a resolution reaffirming the law of November 6, 1950, concerning territorial waters, an August 25 American Embassy dispatch from Quito points out.

The resolution reasserts Ecuador's claim to a 12-mile limit drawn from a base line as provided by the law of November 6, 1950.



However, that law has been interpreted in effect to claim a 36-mile limit since it claims 12 miles at 20 to a degree, whereas, there are actually 60 miles in a degree, and the maps prepared by the Ministry of National Defense, which were submitted with the despatches under reference, show a 36-mile limit.

However, the Chief of the Ecuadoran Navy informed an officer of the Embassy that the law of November 6, 1950, was confusing and that apparently the phrase "20 to a degree" had something to do with Spanish leagues, and that, in any event, the resolution passed by Congress on August 20 represents a clarification and interpretation of the law. He stated that he had conferred with Congressional leaders and those congressmen particularly responsible for the resolution of August 20, 1952, and that on the basis of these conversations it was clear that the intent of Congress both in the law of November 6, 1950, and the resolution of August 22, 1952, was to assert and claim territorial waters 12 miles out from the base line as provided by the law, and that the apparent claim to a 36-mile limit was incorrect and resulted from a faulty drafting or interpretation

of the 1950 law. The Chief of the Ecuadoran Navy added that therefore the 36-mile limit shown on the maps under reference is to be disregarded and the maps will be redrawn without this line.

The resolution as passed states:

"THE CONGRESS OF THE REPUBLIC OF ECUADOR CONSIDERING:

"That the territorial sea is an integral part of the national territory, according to Article 4 of our Political Constitution;

"That by Law of November 6, 1950, published in the Registro Oficial No. 756 of the 6th of March, 1951, there was declared the minimum extension of our territorial waters, in the zones surrounding the continental coastlines of Ecuador as well as the zones relative to the Archipelago de Colon;

"That there has arisen the problem of interpretation regarding the various resolutions relative to the territorial waters and to navigation rights, a problem which should not exist by virtue of the categorical declarations contained in the Constitution of the Republic and the Law under reference;

"That it is necessary to reaffirm Ecuadoran sovereignty over the national territory, which includes the territorial waters;

"AGREES:

"To reaffirm the Law passed by the Congress of the Republic on November 6, 1950, regarding national dominion over the territorial waters, which shall include a distance of twelve marine miles counted from the outermost points of the Ecuadoran coastline in the Pacific Ocean, as well as the interior waters of the gulfs, bays, straights, and canals included within a line drawn between these points. At the same time, to ratify Ecuadoran sovereignty over the interior waters included within a perimeter of twelve marine miles counted from the outermost points of the outermost islands of the Archipelago de Colon.

"Given in the Sala de Sesiones of the National Congress in Quito, the twentieth of August, 1952."



Fiji Islands

TUNA VENTURE ASSETS SOLD: The tuna fishing fleet (except the Isa Lei) owned by a fishery company of Suva and the cannery in American Samoa (owned by another firm of that Island) have been sold, according to the Australian Fisheries News-letter of July 1952.

The joint interprise was organized by a former world flier for the purpose of catching tuna in Fijian waters and canning them in American Samoa, which would enable the product to be admitted into the United States duty free. Unfortunately the Fijian company was unable to catch tuna in sufficient quantity.

The clipper, Senibua, which pioneered pole fishing with live bait in Australia, returned to San Pedro, California, where it was purchased. The two other clippers, Senirosi and Senileba, have been sold to the Indonesian Government, and two 48-ft. bait boats to the Ceylon Government.

The cannery was sold by a San Francisco-New York firm. The cannery was purchased by the Samoan Governor's office for US\$40,000 to prevent it being removed to foreign territory.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, MAY 1952, P. 18; JUNE 1951, PP. 56-7; FEBRUARY 1951, PP. 47-9; OCTOBER 1950, P. 41; SEPTEMBER 1950, P. 52; FEBRUARY 1949, PP. 58-9.



French Morocco

SARDINE FISHING POOR: This year's fishing season in French Morocco, according to informed sources, was unfavorable because the sardine schools traveled northward to waters off Portugal. The fishing season is almost over, states a September 5 American consular dispatch from Tangier. Present inability of most Moroccan fishermen to navigate farther north than the entrance to the Mediterranean

is a source of anxiety for future seasons, and contributes to the present serious crisis facing the fishing and canning industry in that country.

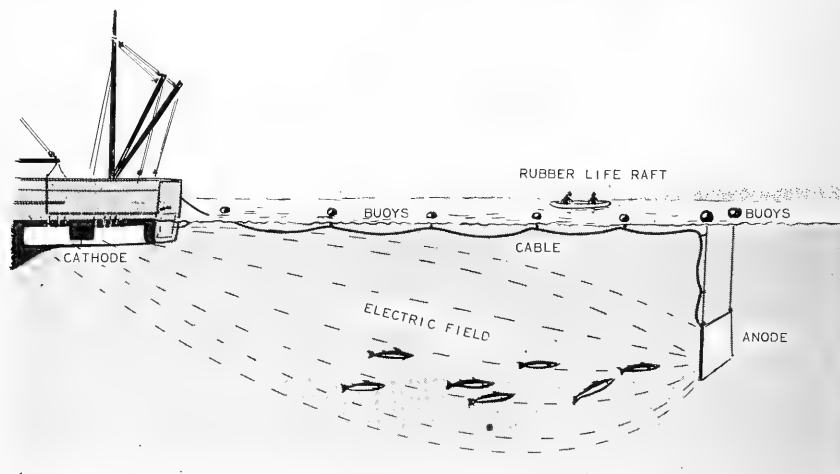


German Federal Republic

ELECTRICAL-FISHING EXPERIMENTS IN SALT WATER REPORTED SUCCESSFUL: The much-discussed electrical fishing equipment developed by Dr. Konrad Kreutzer in Hamburg, Germany, was seen by the author on June 3, and the experimental work done to date was discussed with Mr. H. Peglow. Peglow has been associated with Kreutzer in developing the equipment and in carrying out the experiments.

Two small units and one large unit have been developed. One of the small units is for use in fresh water and the other for use in stunning tuna or other large fish after they have taken a hook. The large unit is that used on the vessel R-96 for experimental use in salt water.

In all three units, power is conserved by using a pulsating direct current with a very high amperage peak. The duration of the discharge of current is extremely short and the period between pulses is much longer than the duration of



AN ARTIST'S CONCEPTION OF HOW ELECTRICAL-FISHING EXPERIMENTS WERE CONDUCTED AT SEA.

the discharge. The controlling switches are designed in such a manner that they do not carry any current at the time that the switch is opening or closing. This prevents the usual burning of the contact points and allows the use of very small switches for the size of the current carried.

The fresh-water unit is designed to operate from 24-volt storage batteries and weighs about 24 pounds without the batteries. It is capable of putting out 120 amperes and is supposed to be able to cover an area 30 meters in diameter. A number of these units have been manufactured and sold to various European government agencies and research institutions. The unit is said to be selective as to the size of fish, with larger fish responding to the current more readily than smaller fish.

The shocking unit for tuna is somewhat larger than the fresh-water unit, and is made to handle four tuna lines. As soon as the tuna takes the hook and the hook is set, the button controlling that line is pressed and the fish is paralyzed. It can then be landed without difficulty. If the fish begins to revive before being landed, it can be given another "shot." Consequently, one person can handle several lines if necessary. The average size of tuna on which the device was tested was approximately 275 pounds.

The large unit, which is being used for experimental salt-water work, is on the former German Navy mine sweeper R-96. This vessel originally had two 900 horsepower Diesel engines. One of the engines has been removed and the electrical apparatus installed in its place. The equipment consists of a 400-kilowatt DC generator, a large bank of inductance coils, a large bank of condensers, a control apparatus, and a mechanical impulse switch. In the recent experiments, the cathode consisted of large curved steel plates fastened to the hull near the stern of the vessel and the anode was a large steel plate which could be suspended from floats at a distance from the vessel. The area of the cathode was estimated to be approximately 45 square feet and that of the anode 25 square feet.

An experimental cruise was made at sea during April of this year. Peglow emphasized that they had not caught fish with the device, and that they had not tried to catch fish with it. He stated that they were anxious to first prove that fish could be led in the direction desired with electrical equipment and then to find a means of applying this knowledge to fishing apparatus. On this cruise it was proven that in salt water fish could be made to travel towards the anode with the equipment on the vessel. Live herring were released between the vessel and the anode. The anode was reported to be approximately 18 meters (about 59 feet) from the vessel. The current was then turned on and off at varying intervals. Whenever the current was on, the fish immediately swam toward the anode. When the current was turned off, the fish began swimming in the direction that they were traveling before the current was turned on.

Now that it is known that the fish can be made to swim toward the anode, work will be begun on finding the specific frequency for various types and sizes of fish and on practical applications of the method. In general, larger fish respond to lower current impulses than do smaller fish. Experiments indicate that flatfish do not respond to electrical stimulation in the same manner as do other fish, and that they probably cannot be controlled as can other fish.

In the salt-water equipment, the pulse shape is very high and narrow, with a peak pulse current of as high as 25,000 amperes and a duration of 2 milliseconds. The rate of pulsation can be varied from 0 to 100 pulses per second. The rate of pulsation is correlated with the type and size of fish attracted by the anode.

The formula for determining the area over which the equipment may be effective is as follows:

$$R = \sqrt{\frac{I \cdot F \cdot w}{G \cdot 2\pi}}$$

In this formula, R is the radius of the area over which the current will be effective in attracting fish; I is the peak impulse current (expressed in amperes); F is the length of the fish; W is the specific resistance of the sea water which varies with salinity and temperature; G is the "anatomic voltage drop" between the head and tail of the fish. If the anode is placed at a point away from the surface or bottom, the 2π is changed to 4π as the field affected by the current will be changed to a sphere rather than a hemisphere. The "anatomic voltage drop" of most

salt-water species is usually between 0.5 and 0.3 volts. However, it will vary from one species to another. (In this formula all distances should be expressed in the same unit. For instance, if R is desired in meters, F should be in meters and G should be in ohms per cubic meter.)

In connection with the experiments in electrical fishing in salt water, it has been discovered that when a cable conducting the pulsating direct current is run through the water, a field is set up around the cable that fish will not penetrate. Based on this phenomenon, Peglow suggested that in conjunction with their equipment it may be possible to use a single cable set in a circle, as an electric purse seine. However, additional experimental work is needed on this phase of the project.

Because of limited financial resources, the experiments are proceeding very slowly but, at the present time, they give every indication of ultimate success for the salt-water equipment. The other two devices seem to be already proven and are in limited commercial production.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, JUNE 1952, P. 39; OCTOBER 1951, P. 25; JANUARY 1951, P. 53; DECEMBER 1950, P. 36; AND P. 75 OF THIS ISSUE. ALSO FISHERY LEAFLET 348 (GERMAN COMMERCIAL ELECTRICAL FISHING DEVICE).

C. E. PETERSON CHIEF, STATISTICAL SECTION
BRANCH OF COMMERCIAL FISHERIES,
U. S. FISH AND WILDLIFE SERVICE, WASHINGTON, D. C.

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DEVELOPMENTS IN INTERZONAL TRADE IN FISH: On May 5, 1952, a new West German-East German barter agreement was signed providing for the delivery to the Soviet Zone of fishery products valued at DM7,500,000 (US\$1,786,000), according to an August 5 American consular report from Bremerhaven. The shipments will be predominantly canned fish, but will include also fresh fish and small quantities of pickled (marinated) fish. No salted herring is to be shipped, much to the disappointment of the West German fishing industry which still has on hand largestocks of salted herring set aside for delivery to the Soviet Zone under the 1951 interzonal trade agreement which became inactive on November 30, 1951. Bremerhaven alone has on hand 30,000 barrels of salted herring valued at DM1,800,000 (US\$428,000) originally set aside for that purpose.

The disadvantage of this barter agreement to the West German fishing industry is that the West German fish merchants must wait for payment until counter-shipments are received from the Soviet Zone and thus have no control over the terms or rate of payment. The advance payments made by the Bank Deutscher Laender under the official interzonal trade agreement do not apply in the barter agreement. This has the effect of restricting interzonal trade to those larger firms that are not dependent on immediate payment for their products. The West German fishing industry feels, however, that in spite of the financial difficulties, deliveries to East Germany must be made in order to avoid losing the market to Holland and Scandinavia.

A further difficulty for interzonal trade in fish was an order issued by the East German authorities in the first week of July 1952 stopping all fish shipments by truck to the Soviet Zone. Whereas previously all West German fish deliveries to the Soviet Zone were by truck, now only rail shipments are to be allowed.

In the first week of May 1952 representatives of the West German fishing industry sent a memorandum to the West German Federal Government requesting a resumption of interzonal trade in the volume set in the Berlin agreement or the conclusion of a barter agreement providing for DM35,000,000 (US\$8,333,000) worth of fishery products and fish meal. To emphasize the danger of losing the East German market to other West European countries, the memorandum pointed out that Holland had sold large quantities of salted herring to East Germany, that Great Britain

also exported salted herring to the Soviet Zone, and that Denmark had concluded a barter agreement providing for the delivery of US\$7,143,000 worth of fish to East Germany. Also, Norway was to deliver 160,000 barrels of salted herring to the Soviet Zone of Germany during 1952. In addition, the memorandum demanded an agreement embodying a guarantee of financial aid to the fish industry in the case of a politically-caused interruption of interzonal trade.

In support of their demand for increased interzonal trade in fish, West German fish merchants state that the Soviet Zone is willing to import DM35,000,000 to DM50,000,000 (US\$8,333,000-US\$11,905,000) worth of fishery products, including 60,000 barrels of herring, from West Germany. The West German Federal Economic Ministry, however, opposes an increase in fish shipments to the Soviet Zone on the grounds that West German's food supply situation requires that food products should be traded only for food products.



Hong Kong

NEW ARTIFICIAL FISH DRIER INSTALLED: A modest but useful plant capable of drying 6,000 pounds of fish in 30 hours has been installed close to the new Aberdeen Fish Market in Hong Kong, according to the July 1952 Current Affairs Bulletin, issued by the Indo-Pacific Fisheries Council Secretariat. After being gutted, washed, and salted, fish are loaded into trays which fit into upright trolleys which can be wheeled into drying chambers. Each of the 12 trolleys can support 12 trays bearing 500 pounds of fish. A draught of air blows through the chamber at $3\frac{1}{2}$ miles per hour. The temperature is raised to 78° F. inside the chamber while humidity is reduced to 50 percent and water is extracted from the fish at 56 pounds an hour. Attached to the plant, there are also two cold-storage rooms each with a capacity of 125 metric tons for storing the fish.



Italy

WHALE FACTORYSHIP ALMOST READY: Italy's first whale factoryship (the Trinacria) will be ready in September, according to the August 9 issue of The Fishing News, a British periodical. The vessel is expected to leave for the Antarctic grounds in November. Of 22,500 tons, the vessel is reported able to process a whale every 50 minutes.



Japan

CONTINUATION OF TUNA IMPORT CONTROLS FAVORED: Important segments of the Japanese tuna industry are in favor of continuing limitations on the export of tuna to the United States, reports an August 19 American Embassy dispatch from Tokyo. The Japanese press (Kyodo, August 16) reported that Japanese exporters of canned tuna have announced "they will continue the voluntary control on export of their products to the United States." These exporters are included in the important Council for Tuna Exports. This Council also includes exporters of frozen tuna. Exports of tuna to the United States are limited by Japanese Government regulations to 1,000,000 cases of canned tuna (brine and oil) and 12,000 tons of frozen tuna. These limitations are for the period April 1, 1952, to March 31, 1953.

Because of an unusually large run of albacore in June, the Government is being subjected to heavy pressure by some units of the industry to raise the quota on frozen tuna. The proponents for relaxation of the control refer to consistent demands from United States importers for more Japanese frozen tuna. Increased demands for frozen tuna are also coming from Canada and Hawaii.

This comment was made after the publication of a "foreign dispatch from Washington that American food canners have asked the Japanese Government for an increase in shipments of Japanese canned tuna goods to the United States."

The Council for Tuna Exports "suggested that due considerations will be paid on the issue if the U. S. Government formally asks for removal of the control.

It added, "Japan exported to the United States 11,500 tons (metric) of frozen tuna by mid-August since the beginning of this year. This figure represents an increase of 4,500 tons over the target for the period. Total volume to be exported to the United States during this year is 12,000 tons."

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TUNA EXPORTS TO CANADA INCREASE: Exporters of Japanese frozen tuna are receiving an increased number of inquiries from firms in Canada. This activity was reported in the Suisan Shimbun on August 8. The Japanese Ministry of International Trade and Industry (MITI) is concerned with the possibility of tuna reaching the United States from Japan through Canada by a three-way trade. Some individuals have charged that three-way trading is being done to bypass the Japanese quotas on export of tuna to the United States. Authorized exports to Canada in 1952 to August 18 were reported to total 2,555 short tons as compared to 1,527 tons for the entire year of 1951, states an August 18 American Embassy dispatch from Tokyo.

Following press item states in part:

"Exports to Canada may jump to 3,000 tons; suspect of three-way trading in frozen tuna dissipated....

"These Canadian inquiries are not only for large quantities but conditions and price are the same as those of American inquiries. It is causing the industry to be very enthusiastic, naturally...."

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TUNA EXPORT QUOTAS TO U. S. MAY BE INCREASED: Japanese tuna export quotas and check prices to the United States were the subject of a meeting of Japanese Government officials on September 15, according to an unconfirmed report published on September 16 by the Japanese press.

Tuna allocations and the check price system on exports to the United States will be continued according to the press report, states an American Embassy dispatch from Tokyo. However, an additional 6,000 metric tons of frozen tuna will be authorized as part of the frozen tuna export quota. This means that the frozen tuna export quota of 12,000 metric tons for the quota year April 1, 1952, through March 31, 1953, will be increased to 18,000 metric tons.

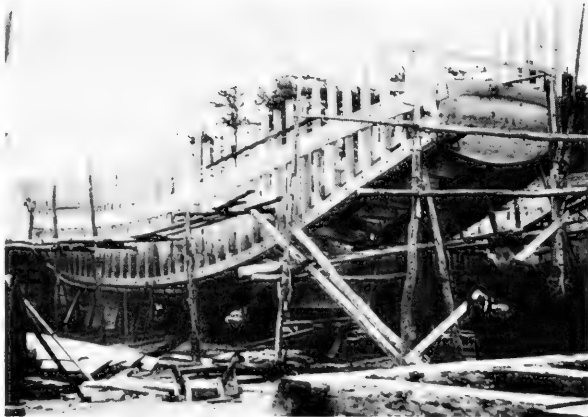
The quota for canned tuna is 1,000,000 cases at the present time, and the press item pointed out that an increased allotment for canned tuna exports will be considered separately.

The press item also stated that United States approval is to be sought by Ambassador Araki for these actions.

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FISHERMEN BUILDING LARGER TUNA BOATS: Japanese tuna fishermen are showing interest in larger boats for operations in distant parts of the Pacific. Plans have been completed to construct a 500-gross-ton boat which will be the largest boat of its kind in the Japanese tuna fishery. Several 300-gross-ton vessels are already in operation and several more of the same class are nearing completion, reports an American Embassy dispatch from Tokyo dated September 8.

The tuna-bonito fleet as of the end of 1951 (latest available published statistics of the Japanese Fisheries Agency) consisted of 1,698 boats, aggregating approximately 104,000 gross tons. Of this total, 1,437 (64,633 gross tons) were wooden boats, many of which fish principally for bonito (skipjack). The balance of 261 were steel boats (39,345 gross tons) engaged in tuna and some skipjack fishing. Most of the wooden boats were less than 100 gross tons. Most of the steel boats (232) were in the 100- to 199-gross-ton class and only 8 in the 200- to 500-gross-ton class. Actually the largest tuna boat in 1951 was 314 gross tons.



THE FRAMEWORK OF A SMALL JAPANESE TUNA BOAT.

According to the Japanese press (Minato Shinbun, August 28), the proposed 500-ton tuna ship will be a converted vessel--the Akagi Maru now engaged in transporting ice to Korea. The new vessel will have a 550 horsepower engine, capable of 9 knots. Conversion of the vessel will begin in September. October 20 is scheduled as the sailing date for her first tuna trip.

Tuna boats of this 500-ton class are arousing special interest of Japanese tuna-boat operators as a basis for determining whether boats of this type can efficiently and profitably replace the mothership-type tuna fleet.

Successful fishing by large-size Japanese tuna boats (300-gross-ton class) in waters south of Hawaii has stimulated interest in the construction of larger vessels. The Japanese press (Nihon Keizai, August 13) reported:

"A number of large-size fishing craft, with a tonnage of 300, or twice the average thus far used in fishing operations, are showing good results in their fishing activities in waters south of Hawaii, chiefly because of their long cruising range and excellent cold-storage equipment. Stimulated by these excellent fishing craft, as many as 7 fishing vessels are now under construction, and the building of 3 others has already been authorized by the Government, in addition to the previous applications filed with competent government authorities for several of these craft.

"On the other hand, since the total tonnage of tuna-fishing craft is pegged at a certain limit, fishermen desiring to build new vessels must purchase an authorized tonnage from others. An increasing number of fishermen who possess small-type vessels of 40 to 50 tons and inefficient craft of the 100-ton class that were built increasingly in postwar years, are selling their authorized tonnage. The quotation of such transactions, which was about 10,000 yen per ton (US\$28) at the beginning of this year, recently rose by several thousand yen per ton."

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NORTHERN PACIFIC SALMON EXPEDITION EXCEEDS CATCH GOALS: The Japanese salmon expedition operating in the Northern Pacific has exceeded the catch goals set by the Japanese Fisheries Agency and the three participating companies. As of July 31, the expedition's salmon catch totaled approximately 2,000,000 fish against the Fisheries Agency target of 1,500,000 fish and the companies' goal of 1,830,000 fish. The expedition began fishing about May 10.

Following is a Japanese press item (Kyodo of August 4):

"Fourteen ships, part of Japan's first postwar salmon and trout expedition to North Pacific, returned to Hakodate yesterday with over-target catches.

"The 14 ships belong to a Japanese fishery firm, but two other companies also took part in the fishing. The ships consisted of the mothership Tenryu Maru, 10 catcher boats, two survey ships, and one patrol boat.

"The skipper of the mothership said the first expedition shows salmon and trout fishing in North Pacific is a paying enterprise. He warned against a rush of ships to this fishing region for salmon and trout as it would be detrimental to preservation of the fishing resources.

"He said most of the catch boats had their nets worn out by the time the expedition ended. Therefore, if boats carry more spare nets, catches would increase...."

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NORTH PACIFIC SALMON EXPEDITION CATCH: The Japanese Fisheries Agency has issued a final tabulation (see table) of the catch of salmon by the Japanese expedition which recently operated in the North Pacific, states an August 18 American Embassy dispatch from Tokyo. The expedition consisted of 3 fleets with a total of 50 catcher boats. Fishing began on May 10 and ended on August 6. The fleet operated south and west of the Aleutians (west of 177° E. longitude) until July 3, then shifted to better fishing grounds off Kamchatka and northern Kurile Islands.

North Pacific Salmon Expedition Catch	
Species	No. of Fish
Red Salmon	737,489
White Salmon	638,571
Trout	701,157
King Salmon	1,365
Silver Salmon ...	24,205
Total	2,102,787

One fleet left the fishing grounds on August 6, a second on July 30, and the last on July 28.

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ADDITIONAL GOVERNMENTAL FINANCIAL ASSISTANCE PLANNED FOR FISHERIES: The Japanese Government is planning additional financial assistance to the Japanese fisheries. A special credit fund is expected to be created. This fund will be used

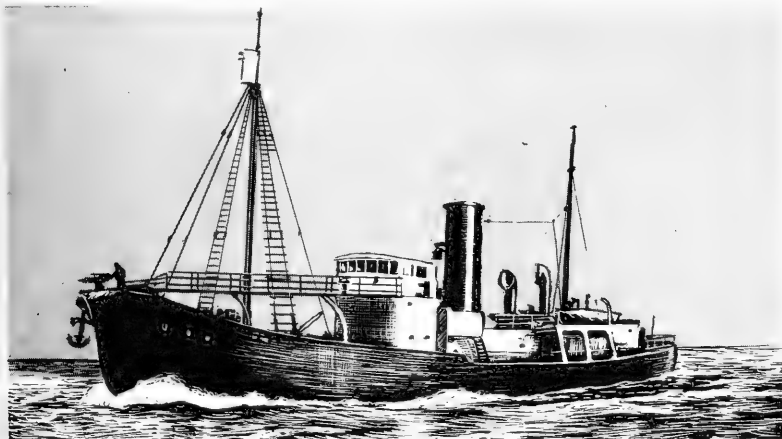
for the financial relief of smaller fishery firms. The plan was publicized in the press (Kyodo, July 22) and confirmed by the Japanese Fisheries Agency, reports a July 30 dispatch from the American Embassy at Tokyo.

The plan is to establish a fund in the amount of 2 to 4 billion yen (US\$ 5,555,000 to \$11,100,000). This fund will be created by deposits from fishermen's federations, and prefectural governments. The fund will guarantee repayment of loans borrowed by the members of the fund from the Agricultural and Forestry Central Bank (Government institution) and other financial institutions. The Government will in turn guarantee payments made from the fund. The fund will be administered by the Minister of Agriculture and Forestry (which includes the Fisheries Agency) and the Minister of Finance.

A bill to provide proper legislative measures to establish and operate this fund will be introduced in this next session of the Diet which was expected to reconvene in September.

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REPORT ON NORTHERN PACIFIC WHALING: The Japanese whaling expedition to the northern Pacific has caught 44 whales in 10 days since it started fishing July 19,



A TYPICAL JAPANESE WHALE CATCHER OR KILLER BOAT (385 GROSS METRIC TONS) USED IN ANTARCTIC WHALING.

according to a report received by the Japanese Fisheries Board (Fisheries Agency). This was reported in the Japanese press (Kyodo, July 29) and was confirmed by an official of the Japanese Fisheries Agency, states an August 5 American consular dispatch from Tokyo.

The Japanese whalers have resumed fishing in this part of the world after an 11-year suspension. The catches are slightly lower than the target of 5.5 whales a day. But the Fisheries Board expects the hauls will increase if the weather improves.

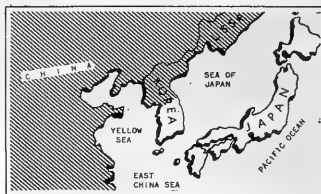
The expedition is being undertaken jointly by three leading fisheries companies. The whaling team consists of one mothership, four catcher boats, and eight transports.

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FISHERMEN SEEK PROTECTION AGAINST BOAT SEIZURES BY RUSSIA AND RED CHINA:

Japanese fishermen have petitioned the Diet and the Japanese Fisheries Agency for protection of Japanese fishing boats against seizure by Russia and Red China, declares an August 14 American Embassy dispatch from Tokyo.

The Nippon Times (August 12) reports: "approximately 280 Japanese fishing boats with some 2,700 fishermen engaged in fishing in the East China Sea and the Sea of Okhotsk (north of Hokkaido) have been captured by Communist patrol boats during the past seven years."



The news item states that Russia captured 195 Japanese boats, of which 134 have been released. Approximately 1,700 Japanese fishermen were captured, but only 1,536 have been released.

Red China has captured 84 Japanese fishing boats and has returned all but one wooden boat. (Note: An official report of the Fisheries Agency shows 87 boats seized by Red China.) Japanese fishermen captured by Red China number 1,040. To date 890 have been released and returned home.

At the present time, Japan has no armed vessels conducting fisheries patrols in any region where Japanese fishing boats are operating.

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PLANS FOR RESUMING PEARL FISHING IN THE ARAFURA SEA: Japanese pearl fishermen are anxious to resume prewar operations in the Arafura Sea between Northern Australia and Dutch New Guinea. Reportedly, negotiations are under way for the formation of a Japanese firm to engage in this pearl fishing. Presumably, proposed areas of fishing are under the territorial jurisdiction of Australia. Permission of Australia's authorities would have to be obtained under such circumstances. Permission of the Japanese Government would also have to be obtained by Japanese to engage in such a fishing enterprise. No request for such permission has been received to date by the Japanese Fisheries Agency, according to the American Embassy at Tokyo in an August 27 dispatch.

A Japanese press item (Kyodo, August 21) reported:

"Japan will shortly resume pearl fishing in the Arafura Sea, between Northern Australia and Dutch New Guinea, pending permission from the Australian Government, the Nihon Keizai reported today.

"Preparations are being made for the resumption of the operations, which have been suspended since the war, by several Japanese firms, the economic daily said.

"If permission is obtained from the Australian authorities, a firm capitalized at ¥200 million will be set up with operations slated to be commenced within this year, the paper said.

"Plans at present call for the extracting of 500 tons of pearls annually, which will be exported to the United States, the journal reported.

"Before the war, an average of some 4,000 tons annually were gathered by the Japanese operating from Palau Island, which then was under Japanese mandate, the paper said.

"These were mainly exported to America for use in making buttons and ornaments.

"Operations after the war were halted because of a loss of the base of operation, ships, and adverse international conditions, the journal reported.

"Improvement in various conditions since Japan's independence, however, prompted these interested to work for the resumption of the pearl operations, the journal said."



Mexico

WEST COAST SHRIMP SEASON DISAPPOINTING: The Mexican west coast shrimp fishing season this year ended by the middle of July and was disappointing, reports an American Embassy dispatch from Mexico dated August 25.

Fishing fleets were being overhauled and shrimp freezing plants closed down towards the latter part of July.

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GUAYMAS' SHRIMP INDUSTRY OUTLOOK FOR 1952/53: August and September are the two months constituting the closed season on shrimp fishing for the Guaymas fleet, and the port during August was filled with boats moving in and out of shipyards as their owners prepared them for the coming season. The shrimp freezing plants also took advantage of the lull to inspect and repair their equipment, reports a September 5 American consular dispatch from Guaymas.

According to data issued by the Instituto de Pesca del Pacifico, the Guaymas shrimp fleet landed during the 1951-52 season (October-July) 3,455 metric tons of shrimp (see table).

It is reliably reported that only five of Guaymas's seven shrimp-freezing plants will be in a position to begin operations in October. The firm operating the remaining two has evidently been so weakened by the industry's financial reverses of the past two seasons (largely a result of overrapid expansion) that without an "angel" from outside the industry it cannot make the necessary outlay to ready both its fleet and plant for operation.

Shrimp Landings by Guaymas Fleet, 1947/48-1951/52	
Season	Quantity
	Metric Tons
1951-52 ...	3,455
1950-51 ...	5,257
1949-50 ...	5,430
1948-49 ...	4,586
1947-48 ...	2,867

Though it is expected that all or nearly all of the Guaymas boats will sail on the opening day of the season (October 1), many will not be properly refitted and equipped to begin a new season. They will not be

able to work through the season unless early trips provide the necessary funds for further repairs.

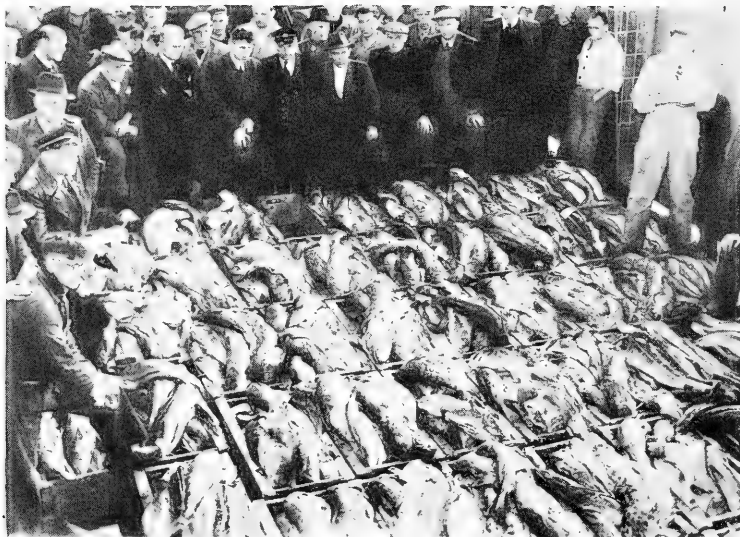


Netherlands

FROZEN FISH INDUSTRY: Packaging of frozen fish, which had its inception in the Netherlands late in 1950, progressed considerably within the past year, according to a July 15 American Embassy report from The Hague.

At present there are two plants engaged in processing frozen fish, both located at Ijmuiden. Their combined capacity is estimated at 500 metric tons of fish per eight-hour working day.

Domestic sales of packaged frozen fish are large and stable, even though there is considerable competition from adequate supplies of fresh fish. On the other hand, exports are erratic, and before there can be any real improvement in



FISH AUCTION AT IJMUIDEN, NETHERLANDS

foreign sales, existing difficulties will have to be worked out. At the present time the two Ijmuiden plants process frozen fish on a customs basis for a variety of Dutch exporters, according to demand. As a result of this system, poor-quality products have sometimes been processed, and packaging has occasionally been sub-standard. However, the industry has now asked the Netherlands Control Board for Fisheries for its cooperation in limiting the number of firms licensed for such exports. In this way the packers hope to eventually standardize their packing methods and streamline the marketing system.

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STABILIZATION OF HERRING MARKET ATTEMPTED: Fishery fleet owners in Scheveningen and Ijmuiden (two important Netherlands fishery ports) are attempting to stabilize the herring market by setting up a fund from which subsidies can be paid to ship owners. When cargoes do not come up to the guaranteed minimum auction

price of fl.11 per 50 kilos (a little over 2½ US cents per pound) the shipowners association will take the herring out of the market and sell it to the fish-meal factories at fl.6 per 50 kilos (almost 1½ US cents per pound). Individual ship owners will receive the difference from the subsidy fund. Capital for the subsidy fund will be raised by a ten percent levy on all auction sales, declares an August 27 American Embassy dispatch from The Hague.



Norway

RECORD TUNA LANDINGS REPORTED: Record quantities of tuna have been landed during the latter part of July and August by Norwegian fishermen off the coast of western Norway, south of Bergen, according to an August 28 news item from the Norwegian Information Service. Large catches have been made off the northern Helgeland district, too. Most of the fishing is done with purse seines, rather than with harpoons and trawl, as in former days.

The unprecedented catch of tuna has strained cold-storage and transport facilities to the limit. In fact, from time to time, supplies have exceeded shore and shipping facilities to the point that tuna fishing has been temporarily banned, as authorized under the Fisheries Act.

The tuna is largely going to Italian canneries, some of which are located as far south as Sicily. Altogether, the Norwegian State Railways have delivered about 550 carloads of frozen tuna to Italy. Other shipments have been made by refrigerated transport vessels.

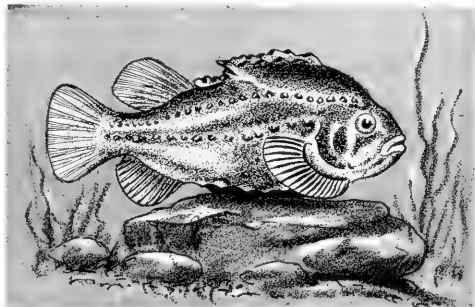
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LUMPFISH FISHERY INCREASING IN IMPORTANCE: The lumpfish (steinbit) fishery has in the last few years played an increasingly important role in the Norwegian fisheries, according to information released by the Norske Frossen-Fisk Technological Department, Bodo, Norway. The catch of 5,000 to 6,000 metric tons in spring and early summer gives work to fishermen and packers in this usually slack season in Norway.

The frozen fish industry has developed the lumpfish from an almost unknown species to a fairly important one. Both in quality and appearance lumpfish yield white-meated fillets which look good in a cellophane package.

Since the lumpfish is fatty and becomes rancid rather quickly in cold storage, special care is taken in handling the fish. The fish are gutted, bled, and the blood close to the backbone removed by the fishermen aboard the boat. They are washed several times until the final wash water remains clean, and then carefully packed in boxes with ice. This preliminary processing is done within one hour after the fish is brought aboard. The fish are filleted ashore and the fillets packaged and frozen.

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LUMPFISH (*CYCLOPTERUS LUMPUS*) IS A BOTTOMFISH WHICH REACHES A MAXIMUM LENGTH OF 23 INCHES AND A MAXIMUM WEIGHT OF 14 POUNDS. THE AVERAGE WEIGHT IS 6 TO 8 POUNDS.

HELICOPTER TO BE USED IN WHALING OPERATIONS: The managers of one of the Norwegian whaling expeditions have ordered a helicopter from England, reports the August 1952 issue of The Norwegian Whaling Gazette. The helicopter will be used in the Antarctic during the 1952/53 whaling operations.



Peru

NO BAIT-FISHING PERMITS: There have been some reports of the possibility of United States tuna-fishing vessels obtaining bait-fishing permits for the territorial waters of Peru. However, according to the latest information available, there is no provision in Peruvian law for issuance of bait permits to foreign fishing vessels. Also, there does not seem to be any possibility that a law permitting the issuance of bait permits will be enacted in the near future.



Republic of the Philippines

REQUEST FOR HIGHER CEILING PRICES ON IMPORTED CANNED SARDINES REJECTED BY GOVERNMENT: A request by a Philippine food importers association for higher ceiling prices on imported canned sardines was rejected by the Philippine President. Importers stated that prices charged or quoted by foreign suppliers were higher. The President expressed the belief that non-importation would force consumers to resort to dried and fresh fish, thereby giving impetus to the development of the local fishing industry, states a September 5 American Embassy dispatch from Manila referring to a news item which appeared in a recent issue of the Bulletin.



Portugal

TWO U. S. VESSELS PURCHASED FOR TUNA FISHING: An Aveiro (Portugal) fishing company has purchased two American submarine chasers for use in tuna fishing, reports an August 29 American Embassy dispatch from Lisbon. Press reports indicate that the vessels are equipped with two 900 hp. motors, and have refrigerated compartments with a capacity of 450 metric tons of fish.

One of these vessels completed a successful trial run on August 26 and both are expected to leave shortly to fish with lines in the area off the Canary Islands.

Except for a few small boats operating from the Cabo Verde Islands, Portuguese tuna fishing has been limited to about three months a year (May-August) when tuna are caught by traps off the Algarve coast. These fish, with dark meat, are sold mainly to Italy. Use of powerful fishing craft and line fishing should make possible a year-round supply of tuna, of which a major proportion would be of the white-meat variety acceptable to the American market.



Sweden

ELECTRIC TUNA FISHING SUCCESSFUL: Electric tuna fishing in Scandinavian waters has now been successfully tried by Swedish fishermen. It is considered such a success that it may revolutionize tuna fishing, reports an August 27 dispatch from the American Embassy at Goteberg.

The method used originates from an invention made by three German scientists who, after some years of experiments, have succeeded in reaching a satisfactory method for electrical fishing of tuna.

The tuna caught in Scandinavian waters can reach a weight of about 800 pounds and are difficult to boat after they are hooked. It is estimated that nine out of ten fish are lost while being hauled on board, but with this new method all hooked fish can easily be hauled on board.

The equipment used is very simple. It consists of one motor converter receiving its current from an accumulator. Small hooks are used. When the fish has been hooked it generally turns around and, when lying parallel with the line, starts running out to free itself. When it turns, it comes into an electric field developed by poles in the hook and the line. The fish becomes temporarily unconscious and can easily be hauled on board. The equipment is easy to manage. It generally consists of three lines with small hooks baited with mackerel and kept at the required depth by floats. When the floats show that a fish has been hooked the current is turned on and the fish hauled in. The fish has to be killed immediately when on board as it does not remain unconscious very long after the current has been cut off.

This electrical method appears to save manpower as two men can fish with three lines and haul one fish on board simultaneously, whereas by the old method it required at least four men on a boat and still only one fish could be hauled aboard at a time. In addition, the number of fish lost was very large.

The price of this equipment is not known, but it is stated to be low and within the range of all fishermen engaged in tuna fishing. It is reported from Norway that electrical tuna-fishing equipment can be fully paid for in a short time.

NOTE: SEE PP. 62-4 IN THIS ISSUE.

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NEW FISH PACKAGING AND MERCHANDISING METHOD: In Sweden extensive use is being made of a new method of packaging and merchandising fishery products. The new method consists of cutting frozen fish in portions. These are packed in plastic bags with all the ingredients necessary for cooking. The package is then vacuum sealed. When the contents are to be used, the whole package is heated in boiling water, reports the November 8, 1951, issue of Fiskets Gang. When sufficiently heated, the fish is ready for eating.



Union of South Africa

CANNED FISH PRODUCTION, FISCAL YEAR 1951: The total canned fish and shellfish pack in the Union of South Africa reached 44,533,000 pounds in the year ended October 31, 1951, of which approximately 25,000,000 pounds were pilchards, 10,000,000 pounds maasbankers, and 6,300,000 pounds spiny lobster.

The total catch of pilchards and maasbankers was reported as 800,000,000 pounds. Data are not available on the catch of rock lobsters.

Domestic consumption of canned fish and shellfish during that year totaled about 19,540,000 pounds and exports were approximately 25,530,000 pounds. Exports of spiny lobster were widely scattered throughout the world. Exports of canned fishery products other than spiny lobsters totaled 20,794,000 pounds in 1951 and reflect the phenomenal growth of this segment of the industry, as only 542,396 pounds were exported in 1946.

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SPINY LOBSTER EXPORT QUOTA FOR 1952 ESTABLISHED: Pending results of investigations by the South African Marine Biological Laboratories, 1952 quotas for the South African spiny lobster industry have been set at 5,300,000 pounds of canned and 2,140,000 pounds of frozen tails. Exports of these products are subject to quota control for conservation purposes, according to the August 23 Foreign Trade of the Canadian Department of Trade and Commerce, and the purpose of the investigations is to determine whether the existing system of control ensures conservation of the country's spiny (rock) lobster resources.

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FISH MEAL FOR HUMAN FOOD: Although fish meal is used in most countries only as a food supplement for animals and is highly successful when fed to cattle, pigs, and poultry, the South African Government is planning to introduce it into the nation's bread, and the idea has been received with enthusiasm by all parties of the House of Assembly, according to the September 6 issue of The Fishing News, a British fishery periodical.

The natives do not get enough protein, vitamins, minerals, and fats in their diet, and their health suffers accordingly. To combat this the South African Government intends to introduce into bread a small proportion of a highly purified and palatable white fish-meal flour.

Announcing this development, the Minister of Health said that successful experiments at Capetown, Pretoria, and Witwatersrand Universities had indicated that the addition of fish meal to bread and mealie meal would go far to curing tuberculosis and blindness among South Africa's population. The Minister added: "I am now in a position to feed 20,000 children in institutes of my department, and we will give them this food."



United Kingdom

TRAWL FOR USE AT PRE-SET DEPTHS: Experiments are in process in Hull and Grimsby with a type of trawl which will keep off the sea bottom and which is expected to catch many fish which go over the top of the ordinary trawl, reports The Fishing News, a British fishery periodical, in its August 23 issue. In addition, since the new type of trawl will operate off the bottom, it should be possible to avoid tearing the net on rocks or rocky bottoms.

Icelandic fishermen have used this type of trawl and have considerably increased their catches.

White fish--round as well as flat--spend the greater part of their lives on or near the sea bottom, but there are times when round fish leave the bottom and school in upper waters. However, to trawl for them in mid-water blindly would not be worth while. Recently, because of the rapid improvement in the sensitivity of the various types of echo-sounding devices, it is now possible to locate schools in mid-water. Frequently skippers report markings on their echo-sounding charts which are believed to indicate clearly schools of fish in mid-water. If a net can be towed with a wide-open mouth at any desired depth and if that depth is capable of rapid adjustment, it seems likely that on some fishing grounds it will be possible to take fish in mid-water.

Reports indicate that the bottom of the fishing grounds near the Westman Islands is so rough that it has never been possible to tow an otter trawl in that area. The general practice was to fish as close as possible to the rocks. This spring it was observed that Icelandic trawlers were sailing right over the roughest of this ground and catching large quantities of cod. Because of this, several enterprising firms in Grimsby and Hull have been carrying out experiments recently, but so far nowhere have conditions been found where results can be obtained comparable with the mid-water fishing on the fishing grounds near the Westman Islands. The English firms have obtained from Iceland full information as to the gear and the methods used by the Icelandic vessel which pioneered mid-water trawling and successfully used it. Therefore, the English experiments are based on the Icelandic mid-water trawling method.

The mid-water trawl is an old idea brought up to date. Net-making firms have been working in cooperation on it and it is based on sketches which were drawn in 1895. Net makers believe that it will be cheaper than the normal type because it needs no "reels" and "bobbins." A net maker was quoted in a daily newspaper as saying: "The nets, which will billow out under the water like huge aerodrome windsocks, will be drawn through the water above the sea bed at any depth required. The net--its secret is in its hauling gear--has already proved successful in trials."

It is essentially a cod trawl for seasonal use when fish school in mid-water. Even if it should be adopted, the present type of trawl would still be needed for flounders and at times when other fish stay close to the bottom. The trawl has not yet been thoroughly tested at sea.

The net maker is also reported to have said: "The net will result in bigger catches, quicker and cheaper trips, and better-quality fish. Skippers of ships equipped with apparatus for indicating fish shoals will now be able to set a depth indicator and their floating nets will go down to the level of the shoal."

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HERRING PRESERVATION METHODS: A summary of the experiments carried out on herring preservation by the Food Investigation Organization of the British Department of Scientific and Industrial Research appeared in the periodical Food Manufacture for September 1952, reports a September 15 American Embassy dispatch from London. This summary as it appeared in the periodical follows:

"Successful preservation of fresh herring should prevent rancidity in the fat and also changes in the texture of the flesh. Rancidity can be prevented by glazing the frozen fish with a thin coat of ice by dipping them in water or by spraying them and storing at -4° F. to -22° F. Fish so treated will keep in good condition for three to six months or more. Changes in flesh texture can be avoided by quick freezing before storing under the same conditions.

"A recently published report describes pilot-scale trials on the freezing and cold storage of herring. Some 137 tons of fish were quick frozen and cold stored at about 0° F. and -17° F. under commercial conditions. Two methods of freezing were used, some of the herring being frozen in a multi-plate freezer, the rest in an experimental air-blast freezer. On examination, it was found that fish frozen by either method and stored at -17° F. were suitable for kippering or distribution as fresh herring after as long as nine months in store, but at 0° F. the storage period was cut to six months or less.

"To maintain a supply of kippers throughout the year, the herring can be frozen and cold-stored immediately they are landed; they can then be withdrawn from storage and kippered as required, to keep the smoke-curing plant working steadily through the year. This method produces the best kippers. Alternatively, the herrings may be kippered on landing and the kippers stored before release to the market. The kippers will remain in good condition for about three months at -4° F. or five months at -22° F. Good kippers can be produced in this way, and the simple freezing process involved may sometimes be preferred to the freezing of herring as a means of spreading seasonal supplies over the year."



Venezuela

CANNED FISH MARKETS SOUGHT: Venezuelan fish cannerys are asking that the Government act to prevent unusually large importations of United States canned sardines during the period before the revised trade agreement takes effect, states a September 15 American consular dispatch from Caracas.



FINAL PROCESSING OF CANNED SARDINES IN A VENEZUELAN CANNERY.

The canners are looking forward to the date when the duty of 2 bolivares per gross kilogram (27.3 US cents per pound) can be applied to United States canned sardines. At the same time, they are complaining of oversupplies which they cannot market in the United States because of high duties.

The canners want the Government to negotiate agreements with the countries of the Far East for Venezuelan canned fish. They believe they can supply fish to Indonesia, the Philippines, and other densely-populated Far Eastern countries. In fact, their only hope for a good market lies in that region, according to the canners.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, SEPTEMBER 1952, PP. 57-9.

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ROVING SCHOOL TO TEACH METHODS FOR SALTING FISH: A roving school to acquaint fishermen with modern methods of salting fish has been established by the Venezuelan Ministry of Agriculture, reports an American Embassy dispatch dated September 18 from Caracas.

The school is housed on a special launch that will visit all the coastal and river points where fish are salted. The Chief of the Bureau of Agricultural Economics, which administers the fisheries, states that at present 80 percent of the fish catch in Venezuela arrives at the market in poor condition.

The system being taught stresses the use of clean water, refined salt, and the use of a press. The Ministry of Agriculture has the presses for sale. In those cases where the fishermen lack funds to purchase these, arrangements have been made with the Banco Agricola y Pecuario to advance them credit for this purpose.

The question is being studied of limiting the marketing of salt fish from those places where the school has taught the new system to the type "bacalao" (salt cod), thus giving the plan impetus.

Venezuela production of salt fish for the calendar year 1951 was 9,875 metric tons, and for the first six months of 1952 it amounted to 8,782 metric tons.

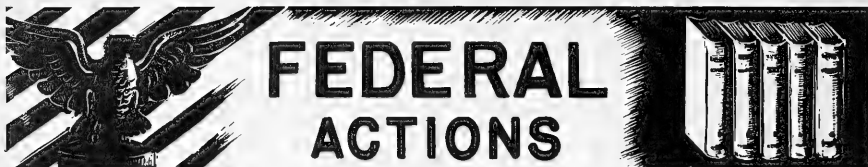


THE MEXICAN FISHERY INDUSTRY

Mexico has practically no offshore fishing fleet. The greater part of all offshore fishing done in Mexican waters is by United States boats. Mexican fish canning plants even contract United States boats to supply their needs for offshore species.

The Mexican fishing industry is dedicated almost entirely to coastal waters, estuary, and lagoon fishing. The average Mexican motor-driven vessel is not equipped for extensive sea voyages and fishermen seldom stay out over 36 hours.

--Fishery Leaflet 339



Department of Commerce

NATIONAL PRODUCTION AUTHORITY

TEMPORARY UNRESTRICTED USE OF CANS MADE FROM EMERGENCY TIN PLATE AUTHORIZED: Direction 5 to NPA Order M-25 gives temporary permission to make unrestricted use of cans or parts of cans made from emergency purchases of tin plate by can manufacturers. This change, issued on September 9, is effective from October 15 through December 31.

This action permits can manufacturers to make and sell cans made of tinplate acquired by a can manufacturer for a specific purpose during the recent workstoppage in the steel industry and not commercially usable for the purpose for which it was acquired. Packers are permitted to use these cans for packing any product irrespective of the can material specifications and quantity-use limitations of M-25. In order to identify the shipments coming under this exemption from M-25, the can manufacturers must furnish certificates to their packer customers.

Direction 4 to M-25, which was issued June 30 and amended July 18, was revoked by NPA on September 9.

For details see: Dir. 5 (Temporary Authority for Manufacture and Use of Cans Made from Emergency Purchases of Tin Plate) dated Sept. 9, 1952, to M-25 (Cans). Dir. 4 (Emergency Packing of Perishable Food Products) Revocation, dated Sept. 9, 1952, to M-25.



Economic Stabilization Agency

OFFICE OF PRICE STABILIZATION

NEW CEILING PRICES FOR SALTED COD SALES IN PUERTO RICO: Ceiling prices for salted cod in Puerto Rico were increased by \$1.20 per hundredweight for sales by importers to wholesalers, by \$1.30 per hundredweight for sales at wholesale, and by 1½ cents per pound for sales at retail. These new prices (effective September 19) were established by Amendment 6 to CPR 51 issued by OPS on September 16. The text of the amendment follows:

NEW PRICES FOR THE SALE OF CODFISH

Pursuant to the Defense Production Act of 1950, as amended, Executive Order 10161, and Economic Stabilization Agency General Order No. 2, this Amendment 6 to Ceiling Price Regulation 51, is hereby issued.

STATEMENT OF CONSIDERATIONS

This amendment to Ceiling Price Regulation 51 establishes new ceiling prices for the sale of salted codfish in Puerto Rico at all levels of distribution.

About 95 percent of the codfish consumed in Puerto Rico is imported from

Newfoundland, under contracts extending from July 1 to June 30 of the succeeding year. The present contract with the Newfoundland Association of Fish Exporters Ltd., otherwise known as NAFEL, expired on June 30, 1952. Under suppliers' present asking prices and at existing ceiling prices, Puerto Rico im-

porters of codfish will not be enabled to receive margins equivalent to those received by them in the pre-Korea period. The increase in ceiling price to importers and in turn of the ceiling price at wholesale and retail should enable these importers to continue to import the codfish and at the same time receive their normal markups in accordance with section 402 (k) of the Defense Production Act. This amendment increases the ceiling prices of codfish by \$1.20 per hundredweight for sales by importers to wholesalers, by \$1.30 per hundredweight for sales at wholesale and by 1½ cents per pound for sales at retail.

In formulating this amendment, the Director has consulted with the Industry

Advisory Committee for Codfish to the fullest extent practicable prior to the issuance of this amendment and has given due consideration to its recommendations. In the judgment of the Director, this amendment is necessary to effectuate the purposes of Title IV of the Defense Production Act of 1950, as amended.

AMENDATORY PROVISIONS

Paragraph (b) of section 2.1 of Ceiling Price Regulation 51 is amended to read as follows:

(b) *Ceiling prices.* Ceiling prices for salted codfish are established as follows:

Salted codfish:

Sales to wholesalers (per 100 pounds).....	\$19.50
Sales at wholesale (per 100 pounds).....	20.50
Sales at retail:	
1 pound.....	.24
2 pounds.....	.47

(Sec. 704, 64 Stat. 816, as amended; 50 U. S. C. App. Sup. 2154)

Effective date. This Amendment 6 to Ceiling Price Regulation 51 is effective September 19, 1952.

TIGHE E. WOODS,
Director of Price Stabilization.

SEPTEMBER 19, 1952.

For details see: Amdt. 6 (New Prices for the Sale of Codfish) to CPR 51 (Food Products Sold in Puerto Rico), dated Sept. 16.



Department of the Interior

SETON THOMPSON APPOINTED TO INTERNATIONAL FISHERIES COMMISSION: The Secretary of the Interior announced in September that Seton H. Thompson, Chief of the Fish and Wildlife Service's Branch of Alaska Fisheries, has been appointed by President Truman as one of the two United States members of the International Fisheries Commission. Thompson succeeds Milton C. James who retired on March 31 as Assistant Director of the Service.

The International Fisheries Commission is responsible for the regulation of the halibut fishery of the North Pacific Ocean. It was established by a convention between the United States and Canada which was signed on March 2, 1923, and subsequently revised on May 9, 1930, and January 29, 1937. This convention was the first one in the history of the world designed to save a high-seas fishery. The Commission is composed of two members appointed by the United States and two appointed by the Dominion of Canada.

Mr. Thompson has been associated with the U. S. Fish and Wildlife Service and its predecessor agency, the Bureau of Fisheries, since 1926. From 1929 to 1931 he was engaged in research on the life history of salmon and mollusks of Alaska, seeking methods to protect them. In 1931 he was promoted to Assistant Chief of the Branch of Alaska Fisheries and served until 1941 when he was called to active duty in the Navy. In March 1946 he was released to inactive duty with the rank of Commander, and returned to his former position with the Service. In 1947 he became Chief of the Branch of Alaska Fisheries.



SETON H. THOMPSON

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TUNA INDUSTRY STUDY BY FISH AND WILDLIFE SERVICE: A comprehensive study of the Nation's tuna industry was begun by the Fish and Wildlife Service, the Acting Secretary of the Interior announced early in October. The purpose of the study is to seek information to help the industry "achieve and maintain a sound position in the domestic economy."

A crisis in the domestic tuna industry arose last year when duty-free imports of frozen tuna from Japan and Latin America and increased imports of brine-packed canned tuna from Japan reached unprecedented proportions. Domestic markets were oversupplied with tuna. Particularly on the West Coast, this forced United States fishermen to keep their vessels tied up and cannery operators to close several plants.

As the crisis developed, a bill calling for a three-cents per pound duty on imports of fresh or frozen tuna was considered by Congress. The bill passed the House of Representatives but was turned down by the Senate.

The Senate Finance Committee directed the Tariff Commission on June 26 of this year to investigate the tuna situation, particularly from the standpoint of foreign competition. The study being made by the Fish and Wildlife Service is the result of a petition sent to Secretary of the Interior Chapman on July 5 by six West Coast Senators. The Service study supplements the Tariff Commission investigation, and stresses the long-range position of the domestic industry. Specific subjects being covered by the Service's fishery specialists working on the project include consumption, distribution and marketing, production, and processing.

The following is the letter sent to the Secretary of the Interior by six West Coast Senators:

UNITED STATES SENATE
COMMITTEE ON APPROPRIATIONS

5 JULY 1952

DEAR MR. SECRETARY:

THE SENATE RECENTLY HAD BEFORE IT A BILL (H.R. 5693) WHICH WOULD HAVE PLACED A TEMPORARY IMPORT DUTY OF 3 CENTS PER POUND ON FRESH OR FROZEN TUNA AND WOULD HAVE DIRECTED THE TARIFF COMMISSION AND THE FISH AND WILDLIFE SERVICE TO INITIATE INVESTIGATIONS OF THE TUNA FISHING INDUSTRY. THIS BILL PASSED THE HOUSE BUT FAILED OF PASSAGE IN THE SENATE. THE POINT OF ISSUE WAS ENTIRELY THE 3 CENT DUTY AND THERE WAS NO OBJECTION TO THE CONCURRENT INVESTIGATIONS WHICH THE BILL WOULD HAVE ORDERED.

SUBSEQUENTLY THE SENATE FINANCE COMMITTEE UNANIMOUSLY PASSED A RESOLUTION DIRECTING THE TARIFF COMMISSION TO MAKE THE INVESTIGATION OUTLINED IN THE BILL. THE TARIFF LAW PROVIDES FOR SUCH PROCEDURE, AND THE LETTER OF THE CHAIRMAN OF THE COMMITTEE, SENATOR GEORGE, TO THE CHAIRMAN OF THE TARIFF COMMISSION SPELLED OUT THE REASON FOR THE RESOLUTION. THAT REASON, PRIMARILY, WAS TO ASSIST CONGRESS IN ANY FUTURE LEGISLATION CONCERNING TUNA FISH.

A NUMBER OF THE SENATORS HAVE EXPRESSED CONSIDERABLE INTEREST IN THE INVESTIGATION PROPOSED BY THE BILL INVOLVING THE FISH AND WILDLIFE SERVICE, AND WE THE UNDERSIGNED ARE PETITIONING YOU TO HAVE SUCH A STUDY INITIATED AND CARRIED OUT. WE ARE NOT SUGGESTING ANY TIME LIMIT ON SUCH A STUDY, BUT FEEL THAT ONE WOULD BE IN THE BEST INTERESTS OF THE COUNTRY AND HOPE THAT IT CAN BE STARTED AND CONCLUDED REASONABLY EARLY. THE FINANCE COMMITTEE DIRECTED THE TARIFF COMMISSION TO REPORT BY MARCH 1, 1953.

A COPY OF H. R. 5693 IS ENCLOSED. IN IT YOU WILL FIND THE DETAILS OF THE INVESTIGATION REQUESTED.

YOUR KIND ATTENTION IN THIS MATTER WOULD BE DEEPLY APPRECIATED.

SINCERELY YOURS,

(SGD) WILLIAM F. KNOWLAND
RICHARD NIXON
WARREN G. MAGNUSON
HARRY P. CAIN
WAYNE MORSE-----
GUY CORDON

HONORABLE OSCAR L. CHAPMAN
SECRETARY OF THE INTERIOR
WASHINGTON, D. C.

This letter from the Acting Secretary of the Interior was addressed to each of the six Senators:

UNITED STATES
DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
WASHINGTON 25, D. C.

PRS NO. 2851

JULY 23, 1952

MY DEAR SENATOR _____:

I AM GLAD THAT YOU AND THE FIVE OTHER SENATORS FROM THE PACIFIC COAST STATES BELIEVE THERE IS A NEED FOR A FULL STUDY OF THE TUNA INDUSTRY AND ITS CURRENT PRODUCTION AND MARKETING PROBLEMS. I APPRECIATE, ALSO, THE RECOGNITION IN YOUR LETTER OF JULY 5 THAT THE DEPARTMENT'S FISH AND WILDLIFE SERVICE IS THE PROPER AGENCY TO INVESTIGATE THOSE PHASES OF THE PROBLEM WHICH WOULD NOT COME WITHIN THE SCOPE OF THE TARIFF COMMISSION'S STUDY.

A PRELIMINARY EXAMINATION OF THE SERVICE'S FUTURE PROGRAM WITH RESPECT TO PERSONNEL AND FACILITIES REQUIRED FOR SUCH AN INVESTIGATION INDICATES THAT, IN THE ABSENCE OF SPECIFIC FUNDS, IT CAN BE MADE ONLY BY DEFERRING SOME OTHER PHASES OF PROJECTS OF CONSIDERABLE INTEREST TO THE FISHING INDUSTRY. IN OUR OPINION, HOWEVER, THE SERIOUSNESS OF THE SITUATION CONFRONTING THE TUNA INDUSTRY JUSTIFIES SUCH A COURSE.

A FURTHER, DETAILED REVIEW OF THE SERVICE'S ORIGINAL ECONOMICS PROGRAM, AS WELL AS A CONFERENCE WITH THE TARIFF COMMISSION, WILL BE NECESSARY BEFORE IT WILL BE POSSIBLE TO INFORM YOU MORE FULLY OF THE SCOPE OF SUCH A STUDY AND THE DATE ON WHICH IT CAN BE COMPLETED. INFORMATION IN THIS REGARD WILL BE FORWARDED TO YOU BEFORE THE END OF JULY.

SINCERELY YOURS,

(SGD) MASTIN G. WHITE

ACTING SECRETARY OF THE INTERIOR

The Director of the Fish and Wildlife Service addressed this letter to the six Senators, giving more details on the tuna study which was being undertaken by the Service:

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
WASHINGTON 25, D. C.

MY DEAR SENATOR _____:

AUGUST 12, 1952

IN THE ACTING SECRETARY'S LETTER OF JULY 23, HE INFORMED YOU THAT THE SCOPE AND DATE OF COMPLETION OF THE PROPOSED STUDY OF THE LONG-RANGE POSITION OF THE TUNA INDUSTRY BY THIS DEPARTMENT COULD NOT BE DETERMINED UNTIL REPRESENTATIVES OF THE TUNA AND WILDLIFE SERVICE AND THE TARIFF COMMISSION HAD CONFERRED. THREE CONFERENCES HAVE NOW BEEN HELD IN ORDER TO DETERMINE WHETHER THE WORK TO BE DONE IN THIS FIELD BY THE SERVICE WOULD OVERLAP THE STUDY REQUESTED OF THE TARIFF COMMISSION UNDER THE RESOLUTION OF THE SENATE FINANCE COMMITTEE DATED JUNE 26.

FROM THESE CONFERENCES IT APPEARS THAT, ALTHOUGH THE REQUEST MADE OF THE TARIFF COMMISSION IS VERY BROAD, THERE ARE PHASES WITH RESPECT TO THE LONG-RANGE POSITION OF THE INDUSTRY WHICH CAN BE UNDERTAKEN BY THE SERVICE WITHOUT DUPLICATING ANY WORK CONTEMPLATED BY THE TARIFF COMMISSION.

ACCORDINGLY, THE SERVICE WILL LIMIT ITS STUDY TO THOSE PROBLEMS WHICH WILL SUPPLEMENT THE TARIFF COMMISSION STUDY AND DO ITS UTMOST TO COMPLETE ITS REPORT BY MARCH 1, 1953, AT WHICH TIME THE TARIFF COMMISSION IS SCHEDULED TO FILE ITS REPORT WITH THE FINANCE COMMITTEE.

SINCERELY YOURS,

(SGD) ALBERT M. DAY

DIRECTOR

Since neither additional funds nor personnel were made available to the Fish and Wildlife Service for conducting the tuna study, it became necessary to utilize existing funds and personnel. Present activities had to be rearranged and some dropped in order to conduct the study. Although no time limit was set by the Senators for completion of the study, the Service will make every effort to conclude the study by March 1--the date set for completion of the Tariff Commission tuna investigation requested by the Finance Committee of the Senate.

* * * * *

INTERIOR SECRETARIAL FUNCTIONS RELATING TO PUBLIC LAND MANAGEMENT INCLUDE FISH AND WILDLIFE: Joel D. Wolfsohn is designated Assistant Secretary for Public Land Management, according to Order No. 2702 issued by the Secretary of the Interior on August 29. The Assistant Secretary for Public Land Management is authorized to discharge the duties and perform the functions assigned to this position, including the exercise of Secretarial direction and supervision of the following bureaus:

BUREAU OF LAND MANAGEMENT
FISH AND WILDLIFE SERVICE
NATIONAL PARK SERVICE

BUREAU OF INDIAN AFFAIRS
OFFICE OF TERRITORIES

This change is in accordance with Reorganization Plan No. 3 of 1950.



Department of State

REVISED UNITED STATES-VENEZUELAN TRADE AGREEMENT IN FORCE: The President of the United States on September 19 signed a proclamation stating that the supplementary trade agreement between the United States and Venezuela would enter into force on October 11, 1952. This revised agreement results in an increase in the Venezuelan import duties on three fishery items in that nation's tariff schedules.

NOTE: SEE COMMERCIAL FISHERIES REVIEW, SEPTEMBER 1952, PP. 57-9.

* * * * *

SAFETY-OF-LIFE-AT-SEA CONVENTION: On September 10, 1952, the President issued his proclamation of the International Convention for the Safety of Life at Sea, 1948. This Convention was signed at London on June 10, 1948. The Convention provides for improved standards for safety of life at sea in the fields of ship construction, fire protection, lifesaving appliances, radio equipment, dangerous cargoes, and navigation generally.

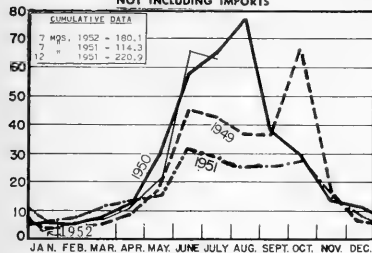
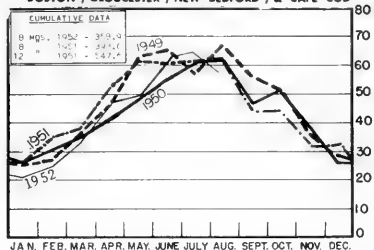
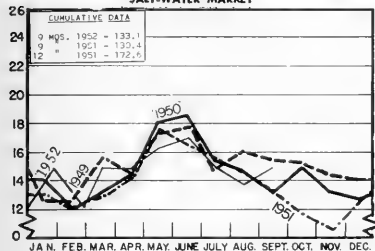
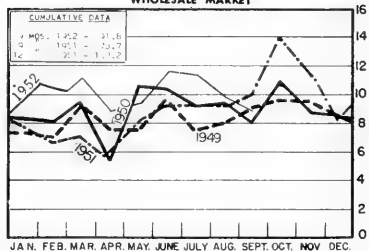
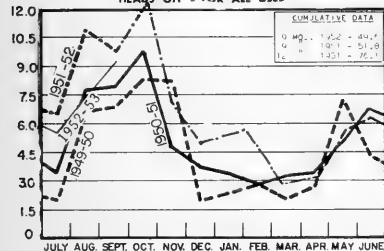
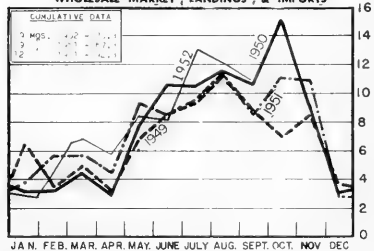
In accordance with its terms, the Convention will enter into force on November 19, 1952. It will replace the convention of May 31, 1929, of the same character, as between parties to the 1929 convention which have also accepted the 1948 convention.

In addition to the United States, countries which have accepted the Convention to date are: Belgium, Canada, Denmark, France, Iceland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Pakistan, Portugal, Sweden, Union of South Africa, United Kingdom of Great Britain and Northern Ireland, and Yugoslavia.



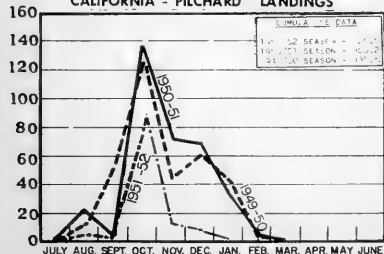
LANDINGS AND RECEIPTS

In Millions of Pounds

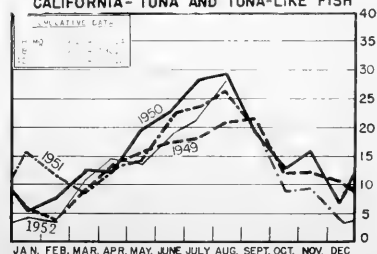
MAINE - LANDINGS
NOT INCLUDING IMPORTSMASSACHUSETTS - LANDINGS
BOSTON, GLOUCESTER, NEW BEDFORD, & CAPE CODNEW YORK CITY - RECEIPTS OF FRESH & FROZEN FISH
SALT-WATER MARKETCHICAGO - RECEIPTS OF FRESH & FROZEN FISH
WHOLESALE MARKETGULF - SHRIMP LANDINGS
HEADS OFF - FOR ALL USESSEATTLE - RECEIPTS OF FRESH & FROZEN FISH
WHOLESALE MARKET, LANDINGS, & IMPORTS

In Thousands of Tons

CALIFORNIA - PILCHARD LANDINGS



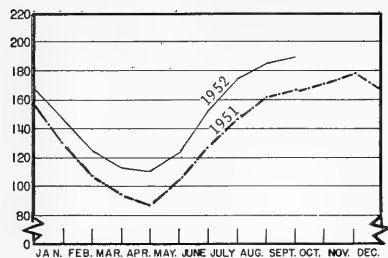
CALIFORNIA - TUNA AND TUNA-LIKE FISH



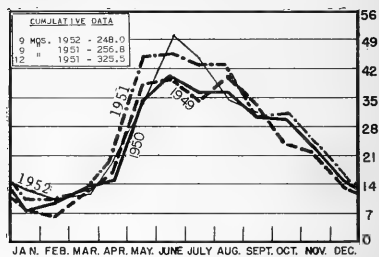
COLD STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS

In Millions of Pounds

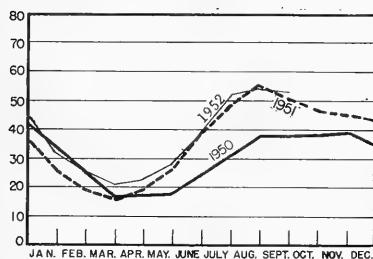
U.S. & ALASKA - HOLDINGS OF FROZEN FISH



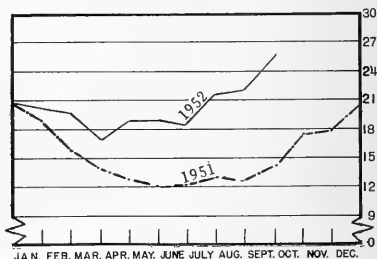
U.S. & ALASKA - FREEZINGS



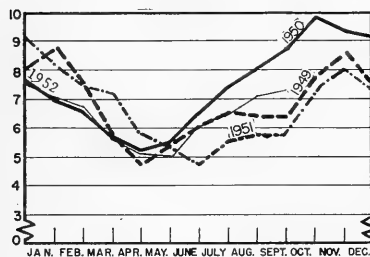
NEW ENGLAND - HOLDINGS OF FROZEN FISH



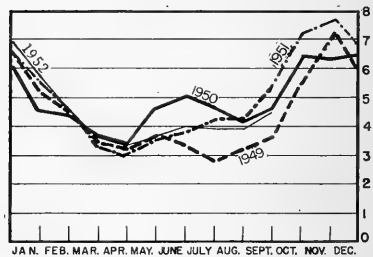
NEW YORK CITY - HOLDINGS OF FROZEN FISH



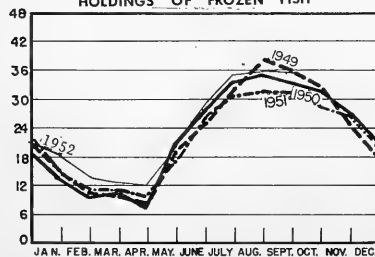
CHICAGO - HOLDINGS OF FROZEN FISH



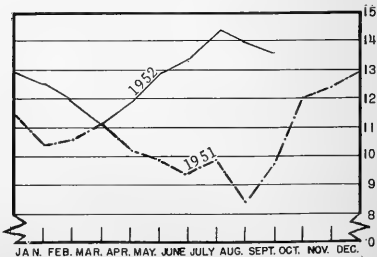
GULF - HOLDINGS OF FROZEN FISH



WASHINGTON, OREGON, AND ALASKA - HOLDINGS OF FROZEN FISH

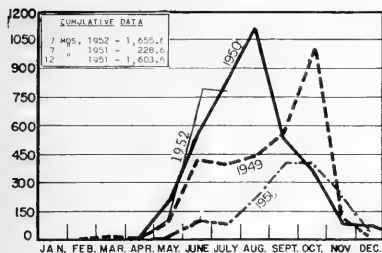


CALIFORNIA - HOLDINGS OF FROZEN FISH

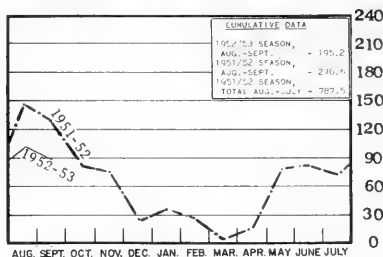


CANNED FISHERY PRODUCTS

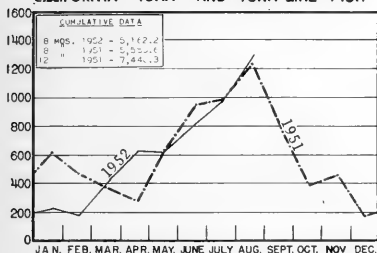
MAINE - SARDINES, ESTIMATED PACK



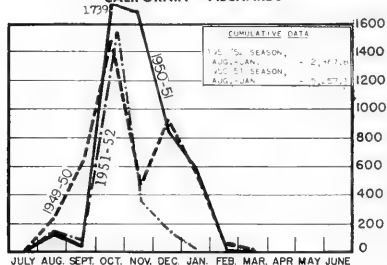
UNITED STATES - SHRIMP



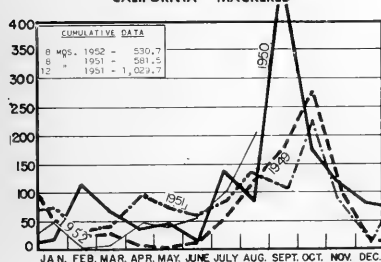
CALIFORNIA - TUNA AND TUNA-LIKE FISH



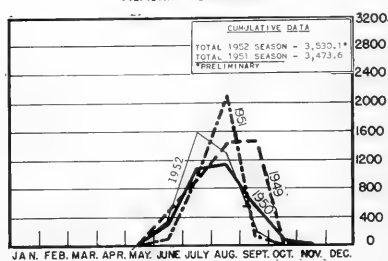
CALIFORNIA - PILCHARDS



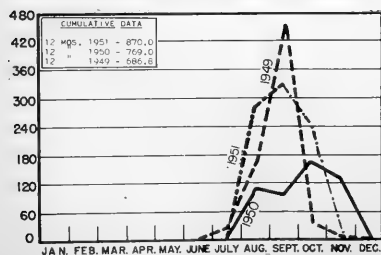
CALIFORNIA - MACKEREL



ALASKA - SALMON



WASHINGTON - PUGET SOUND SALMON

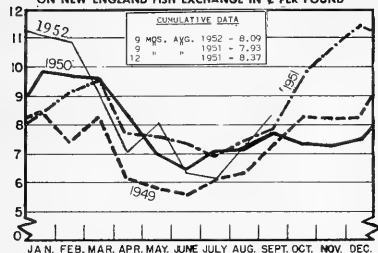


STANDARD CASES

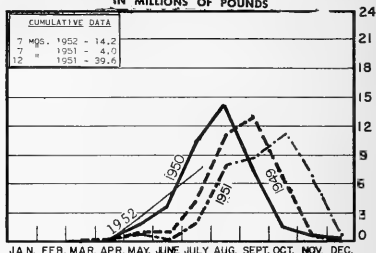
Variety	No. Cans	Can Designation	Net. Wgt.
SARDINES	100	1/4 drawn	3 1/4 oz.
SHRIMP	48	—	7 oz.
TUNA	48	No. 1/2 tuna	7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
MACKEREL	48	No. 300	15 oz.
SALMON	48	1-pound tall	16 oz.

PRICES, IMPORTS and BY-PRODUCTS

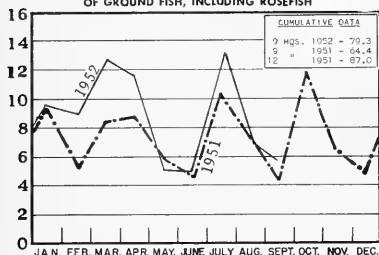
**BOSTON - WEIGHTED AVERAGE PRICE
ON NEW ENGLAND FISH EXCHANGE IN ¢ PER POUND**



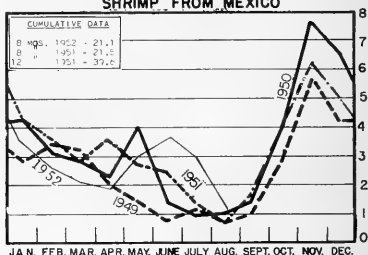
**MAINE - IMPORTS OF FRESH SEA HERRING
IN MILLIONS OF POUNDS**



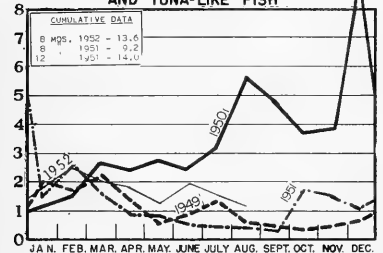
**U.S. - IMPORTS OF FRESH & FROZEN FILLETS
OF GROUND FISH, INCLUDING ROSEFISH**



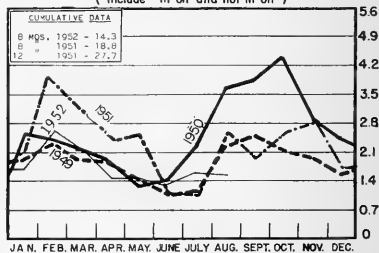
**U.S. - IMPORTS OF FRESH AND FROZEN
SHRIMP FROM MEXICO**



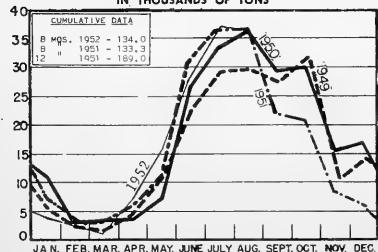
**U.S. - IMPORTS OF CANNED TUNA
AND TUNA-LIKE FISH**



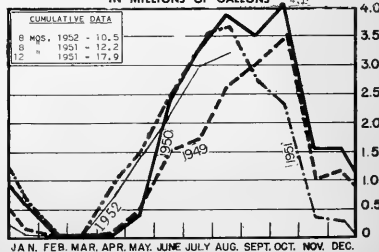
**U.S. - IMPORTS OF CANNED SARDINES
(include in oil and not in oil)**



**U.S. & ALASKA - PRODUCTION OF FISH MEAL
IN THOUSANDS OF TONS**



**U.S. & ALASKA - PRODUCTION OF FISH OIL
IN MILLIONS OF GALLONS**





Recent publications of interest to the commercial fishing industry are listed below.

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

- CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
 SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
 SEP. - SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.
 SSR. - FISH. - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).

Number	Title
CFS-773	- Massachusetts Landings, May 1952, 14 p.
CFS-782	- Frozen Fish Report, August 1952 Final, 8 p.
CFS-786	- Maine Landings, June 1952, 4 p.

Wholesale Dealers in Fishery Products:

SL-29	- Ohio (revised), 2 p.
SL-31	- New York (revised), 2 p.
SL-32	- Minnesota, 2 p.
SL-33	- North Dakota, 1 p.
SL-35	- Illinois, 3 p.
SL-36	- Iowa, 2 p.
SL-38	- Missouri, 2 p.
SL-39	- Tennessee, 1 p.
SL-41	- Arkansas, 2 p.
SL-42	- Kentucky, 1 p.
SL-43	- Alabama, 1 p.
SSR-Fish. No. 71	- Establishing Tuna and Other Pelagic Fishes in Ponds and Tanks, February 1952, 23 p.

Number	Title
SSR-Fish. No. 72	- English Translations of Fishery Literature (Additional Listings), March 1952, 34 p.
SSR-Fish. No. 75	- Water Temperatures of California's Central Valley, 1949-51, May 1952, 49 p.

Sep. 321 - Experiments on the Escape of Undersized Haddock Through Otter Trawls.

Sep. 322 - Preliminary Investigation of the South-eastern Alaska Abalone:
 Part I - Exploratory Diving.
 Part II- Technological Studies on Handling Aboard Ship and Preparation Ashore, and Acceptability of the Cooked Products.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE AGENCIES ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE AGENCIES OR PUBLISHERS MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

Alaska Seafood Recipes (from the Fishery Products Laboratory), edited and revised by Charlotte D. Speegle and Marjorie Bassett, 79 p., processed. Published jointly by the Fisheries Experimental Commission, the Agricultural Extension Service, and the Alaska Development Board. (Copies are being distributed in Alaska by the Agricultural Extension Service, College, Alaska; the Alaska Development Board, Box 50, Juneau, Alaska; and the Fishery Products Laboratory, Ketchikan, Alaska.) After being out of print for several

years the new edition of this popular booklet is back with all the old favorite recipes and many added new ones. An attractive color cover, information on purchasing fish, and notes on the various species of fish have been added to make the booklet a handy addition to the homemaker's cookbook file. All recipes have been tested by the home economist at the Ketchikan Laboratory. Included in the 80-page booklet are over 100 recipes for fish and shellfish, outdoor fish cookery, sauces and stuffings, and kelp pickles.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILD-LIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE AGENCIES ISSUING THEM.

An Annotated Bibliography for the Student of Texas Fishes and Fisheries (with Material on the Gulf of Mexico and the Caribbean Sea), by J. L. Baughman, 243 p., processed. Texas Game and Fish Commission, Rockport, Texas. A bibliography with explanatory notes on Texas fishes and fisheries and material on the Gulf of Mexico and the Caribbean Sea.

Annual Report of the Fisheries Research Board of Canada for the Year 1951, 185 p., illus., printed (introduction is in English and French and balance of report in English). Fisheries Research Board of Canada, Ottawa, Canada, 1952. Full reports are presented of the work for 1951 of the biological and experimental stations of the Fisheries Research Board of Canada. The scientific and industrial work of the Board is organized in three closely coordinated fields of study: biology of fish and other marine organisms, oceanography, and technology of fish processing. Seven laboratories are maintained although much of the work is done at sea, at fishing ports, and on the rivers. Stations at St. Andrews, N.B., at St. John's, Newfoundland, at Nanaimo, B.C., and at Winnipeg, Manitoba, provide bases for operations in biology and oceanography. Stations at Halifax, N.S., at Grand River, Quebec, and at Vancouver, B.C., are the centers of work on processing, storage, and transportation of marine foods and on the production of byproducts. For the past five years a small party has worked on the biology and oceanography of the Eastern Arctic. A list of the publications and reports that were published in 1951 by the Board is included.

(Ceylon) Administration Report of the Acting Director of Fisheries for 1951, by E.R.A. de Zylva, 30 p., printed, 75 cents postpaid. Government Publications Bureau, Colombo, Ceylon, June 1952. Progress reports for the year 1951 are presented by the Department of Fisheries' Administration Division, Socio-Economic Division, Development Division, and Research Division. Among the subjects covered are: enforcement of fisheries regulations; improvement of harbor facilities; cooperative development of the fisheries; loans granted to individual fishermen, unregistered fishing groups, and registered cooperative fishing societies; rescue services and relief to fishermen in distress; fisheries trainingschools; mechanization of local fishing industry; brackish and fresh-water fisheries; fish marketing; curing of fishery products; manufacture of fishery byproducts; and refrigeration and transportation facilities. Statistical data are also included on the production of fresh and cured fish, and imports and exports of fishery products and byproducts.

Fish and Ways to Serve It, by Marie C. Doermann, Leaflet 79, 8 p., printed. Extension Service, College of Agriculture, Rutgers University--the State University of New Jersey, New Brunswick, N. J. Contains 16 recipes for fish and shellfish and a number of recipes for sauces, as well as a short discussion on how to select fish and amounts to buy.

Fish For Year 'Round Salads, Consumer Bulletin No. 4, 6 p., printed. Department of Fisheries, Ottawa, Canada (revised June 1952). Tested fish and shellfish salad recipes and suggestions for salad combinations.

"How to Mount a Fish," by Gustaf T. Sundstrom, article, Popular Homecraft, September-October 1952, vol. 22, no. 7, p. 61, illus., printed, 35 cents per issue. General Publishing Co., Inc., 154 East Erie St., Chicago 11, Ill. (Reprints of this article and the previous one--"How to Make Life-Like Model of Your Prize Catch"--are available free upon request from the Branch of Commercial Fisheries, U. S. Fish and Wildlife Service, Washington 25, D. C.) This article gives step by step directions on how to mount a whole fish or a fish head. It is the second of two articles, the first of which described the simplest and most practical methods of making an artificial model of a fish.

An Illustrated Check List of the Marine Mollusks of Texas, by T. E. Pulley, reprint from The Texas Journal of Science, vol. IV, no. 2, pp. 167-199, June 30, 1952. Although many authors have recognized and deplored the lack of information concerning the fauna of the northern and western Gulf of Mexico, at least 450 species of marine mollusks have been recorded in the literature as occurring in Texas. Many of these records are obviously in error while others are extremely doubtful. The purpose of this paper is to bring together all of the species reported in an attempt to decide which ones are actually members of the Texas fauna. For each species, the occurrence of which has been confirmed by the present author, some remarks are given as to its range on the Texas coast. For unconfirmed species, the name of the reporting author is given, the locality where it is known to occur, and wherever possible, a statement is made as to whether its presence on the Texas coast is likely or doubtful. No attempt has been made to include synonyms, and many of the species attributed here to other authors bear the names which are now considered correct rather than the names under which they have appeared in lists of Texas shells.

(Japan) Statistic Tables of Fishing Vessels, 1951, General Report No. 4, 226 p. with graphs, printed, in Japanese and English (not available for general distribution). Japanese Fisheries Agency, Tokyo, Japan. This is the fourth annual report which lists data on the various types of Japanese fishing craft as obtained by a fishing-vessel registration system. Statistics are given by types of gear, fishery, craft, and principal prefectures, together with comparisons for former years.

(MSA) Monthly Report of the Mutual Security Agency to the Public Advisory Board (Data as of May 31, 1952), 81 p., illus., processed. Division of Statistics and Reports, Mutual Security Agency, Washington 25, D. C. Included are charts and tables summarizing important activities under the economic assistance and defense support pro-

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILD-LIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE AGENCIES ISSUING THEM.

grams of the Mutual Security Agency and its predecessor, the Economic Cooperation Administration, through May 31, 1952. Charts and appendix tables on the European program cover MSA/ECA operations beginning with April 3, 1948, to date. Charts and appendix tables on the Far East program cover MSA/ECA operations under the China Area Aid Act of 1950. A section of the report deals with current economic developments in Western Europe.

The National School Lunch Program, PA-208, 19 p., illus., printed. Production and Marketing Administration, U. S. Department of Agriculture, Washington 25, D. C., June 1952. Report on the progress of the National School Lunch Program since 1944. The charts presented trace the growth of the Program, in terms of the number of participating children and the number of meals served. The charts also show the extent to which the Program is fulfilling its nutritional and agricultural objectives, the high quality of the meals served, and the large quantities of food used.

Report on the TILAPIA and Other Fish and Fisheries of Lake Nyasa, 1945-47, by Rosemary H. Lowe, Fishery Publications, vol. 1, no. 2, 137 p., illus., printed, £2 net (US\$5.60). Colonial Office, London, England. (Available from Her Majesty's Stationery Office, London, England, 1952). A report in three parts on an investigation into the life histories, habits, and growth rates of certain species of Tilapia and other fish of Lake Nyasa. Part One contains a study of the general ecology of the Tilapias and suggestions for future development and control of the fishery. Part Two covers the biology of the Nchila (*Labeo mesops*) and development of the fishery; fisheries for predatory fish; the Mpsa (*Barilius microlepis*) fishery; and the Utaka (*Haplochromis species*) fishery. Part Three discusses the general control and development of the fish industry, and a summary and recommendations. There are a number of appendixes which include reports on the fish and fisheries of the River Lilongwe, Lake Kazuni, and Lake Chilwa; and a list of scientific and native names of fish mentioned in the report.

Shellfish Definitions and Standards under the Federal Food, Drug, and Cosmetic Act, Service and Regulatory Announcements, Food, Drug, and Cosmetic No. 2, Part 36, 8 p., printed, 10 cents. Food and Drug Administration, Federal Security Agency, Washington, D. C., reprinted June 1952. (For sale by Superintendent of Documents, Washington 25, D. C.) An unofficial print of the definitions and standards of identity and fill of container for shellfish issued under the Federal Food, Drug, and Cosmetic Act. The shellfish covered are canned shrimp, canned oysters, and raw oysters. The standards for these shellfish contained in the pamphlet were all previously published in the Federal Register several years ago. The Act requires the Federal Security Administrator to promulgate reasonable definitions and standards for food to promote honesty and fair dealing in the interest of consumers. After a standard goes into effect, it constitutes the official specification for that food for the purposes of enforcement of the Act. To bear the name of the standardized food, a product may con-

tain only those ingredients and components listed in the standard, in the amount specified. When optional ingredients are permitted, the standard designates those that must be named on the label. The common or usual name of standardized foods must appear on the label, but the Act does not compel label declaration of required ingredients. In the case of unstandardized foods, the labels must name the ingredients.

The Shrimp Fishery, by E. D. McRae, Bulletin no. 32, Marine Laboratory Series III, 21 p., illus., printed. The Texas Game and Fish Commission, Austin, Texas, July 1952. Describes the life history of the common commercial white shrimp (*Penaeus setiferus*), and discusses, in general, the biology of the other species of shrimp. Conservation, recommendations by the Scientific Committee of the Gulf States Marine Fisheries Commission for the protection of the shrimp fishery, and methods of keeping live shrimp are also discussed. Includes statistics on the production and value of Texas shrimp, and a list of Texas shrimp producers, packers, and handlers.

Statistical Services of the United States Government (Revised Edition - June 1952), 80 p., processed. Office of Statistical Standards, Bureau of the Budget, Executive Office of the President, Washington 25, D. C. The purpose of this booklet is to provide a general description of the economic and social statistical programs of the United States Government—where they are located, how the data are collected, and what data are available in these areas from Federal agencies. Part I describes the organization of statistical services within the Federal Government, the methods employed in achieving coordination, and some of the general principles and practices followed in Federal statistical activities. Part II presents brief descriptions of the principal economic and social statistical series. A summary of the statistical responsibilities of Federal agencies and an annotated bibliography of the principal periodical statistical publications issued by Government agencies are presented in appendixes.

TRADE LISTS

The Commercial Intelligence Branch, Office of International Trade, U. S. Department of Commerce, has published the following mimeographed trade lists. Copies of these lists may be obtained by firms in the United States from that Office or from Department of Commerce field offices at \$1.00 per list.

Commercial Fishing Companies and Fish Exporters - Mexico, 9 p. (June 1952). Lists the names and addresses of commercial fishing companies and fish exporters in Mexico. The size of the firms listed is indicated, as well as the type of products handled and the type of business each firm conducts.

Commercial Fishing Companies and Fish Exporters - Denmark, 7 p. (August 1952). Lists the names and addresses of commercial fishing companies and fish exporters in Denmark. The size of the firms listed is indicated, as well as the type of products and the type of business each firm conducts.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE AGENCIES ISSUING THEM.

Commercial Fishing Companies and Fish Exporters - Chile, 10 p., (August 1952). Lists the names and addresses of commercial fishing companies and fish exporters in Chile. The size of the firms listed is indicated, as well as the type of products handled and the type of business each firm conducts.

"Trawling vs. Long-Lining in Quebec," article, Trade News, July 1952, vol. 5, no. 1, pp. 5-7, illus., processed. Department of Fisheries, Ottawa, Canada. Experiments conducted by the Quebec Department of Fisheries Marine Biological Station at Grand-Riviere on the Gaspé Peninsula, which may affect fishing techniques in Quebec waters, are described. Two new types of fishing boats, a long-liner and a small trawler, were used in the tests, and a comparative study was made of the cod taken. Trawler catches varied from 25 to 145 cod per hour, while long-liner catches ranged from 32 to 105. For the entire fishing season, the long-liner's average was 60.5 cod per hour, while that of the trawler was 58.9. A biological survey of cod populations, migratory studies, and a crab canning project are also described.

Uses and Preparation of Maine Sardines - America's all-round Seafood, 31 p., illus., printed. Maine Sardine Industry, Augusta, Maine. The Maine sardine recipes contained in this booklet are the favorites of world-famous chefs, food editors, and other food experts. Also included, are down-to-earth, money-saving recipes from the prudent homemakers of Maine. Some of the recipes are illustrated in beautiful full color. A history of the Maine sardine industry is also included.

"Vacuum Treatment for Canned Fish," article, Trade News, July 1952, vol. 5, no. 1 pp. 8-9, processed.

Department of Fisheries, Ottawa, Canada. From investigations conducted at the Pacific Fisheries Experimental Station of the Fisheries Research Board of Canada, Vancouver, the application of vacuum in pre-treatment of some kinds of fish for canning appears to have important advantages and to be commercially practical. By this means it is very simple to achieve the lowered moisture content required for sardine-type packs, to remove certain odors, and, in the case of tuna, to cool the fish very quickly for the further steps in processing before canning. Experimental equipment, built to test the process, consisted of a small retort and a condenser equipped with a two-stage water ejector for removal of air and other non-condensibles. This equipment was used to prepare experimental packs of herring, anchovies, kippered snacks, and tuna. In all cases the equipment sufficiently dried the product, producing the desired pack containing no free liquid water after final retorting. Investigations made into the industrial application of the process indicate that the most suitable equipment for use in a cannery would consist of a barometric condenser and steam-jet ejectors connected to several cannery retorts. The retorts, which would be evacuated in succession when used in this way, would still be available for the customary pressure retorting at all time. The condenser could operate on either river or sea water. Suggested equipment connected with three "3-car" retorts, could be used to pre-treat about 1,000 cases (of 48 one-pound cans each) per eight-hour day. It would require 125 imperial gallons (150 U. S. gallons) per minute of cooling water, 410 pounds of steam per hour, and cost about \$5,000. Equipment of this size would serve about ten retorts for tuna cooling and cool the tuna in 20 minutes.



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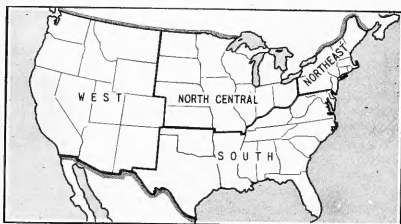


FISH AND SHELLFISH PREFERENCES OF HOUSEHOLD CONSUMERS--

Part II - Regional Summary

Fishery Leaflet 408, Fish and Shellfish Preferences of Household Consumers--1951 (Part II - Regional Summary), summarizes for four regions of the United States the answers of 2,473 persons to questions about the fish and shellfish preferences of their households asked them in an October 1951 survey. The four regions covered, together with the number of respondents in each region, are: Northeast 685, North Central 732, South 734, and West 322. The publication is the second in a series of summaries being issued as fishery leaflets. Subsequent issues will give analyses on a rural and urban basis, income basis, etc.

The survey was conducted by the U. S. Fish and Wildlife Service. Field work was done by a private research firm under contract with the Service. The respondents were asked 52 questions, some with subparts. The questions pertained



predominantly to their preferences and desires with respect to fresh and frozen fish and shellfish, although canned and cured fish were covered in a few instances. Information on frequency of use is given, such as days served, seasons served, kind served, etc.; preferences of fresh versus frozen fish and shellfish; particular preferences with respect to packaging, grading, cooking, cuts preferred, availability of frozen fish and shellfish; and mail order business for frozen fish and shellfish. This information is summarized regionally in this Part II. The initial publication in this series, Fishery Leaflet 407, Fish and Shellfish Preferences of Household Consumers -- 1951

(Part I - National Summary), gave summary data for the United States as a whole.

The work sheets containing the tabulated data for this particular survey are arranged so that various types of summaries may be readily obtained. Only those of general interest will be published by the Service. Anyone interested in studying these work sheets may inspect them in the office of the Branch of Commercial Fisheries, U. S. Fish and Wildlife Service, Washington, D. C.

Free copies of Fishery Leaflet 408 and 407 (Part II and Part I) are available from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.

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